

# THE IRON AGE

A Review of the Hardware, Iron, Machinery and Metal Trades.

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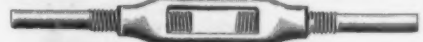
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Adv. on Page 16

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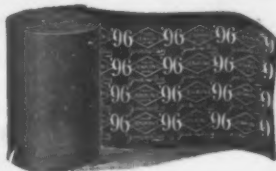
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# THE IRON AGE

New York, Thursday, December 20, 1906.

## The Munzel Gas Engine and Producer.

The Minneapolis Steel & Machinery Company, Minneapolis, Minn., has secured the exclusive American right to manufacture the Munzel gas engine and suction gas producer, the invention of Max Munzel, managing director of the G. Luther Company, Braunschweig, Germany. The system consists in the main of the usual parts, a producer in which the gas is generated, a scrubber in which it is cooled and cleaned, an expansion tank from which the engine draws its supply, and the prime mover which utilizes the gas in the production of power. No fuel is wasted, as all products of combustion, after being thoroughly cleaned, pass through the engine which creates the suction on the system, its load regulating the gas production.

A cross section of the engine, which is of the four cycle horizontal type, and is made in either right or left hand patterns in capacities ranging from 75 to 300 hp., is shown in Fig. 1. The frame is very heavy, the outer cylinder barrel being cast in one piece with it. The air necessary for the explosive mixture is taken in through

inlet valve, with its operating mechanism. This valve and its cage can be removed by taking out four cap screws. The exhaust valve is placed immediately below the inlet valve. The cylinder head is water jacketed down to the exhaust discharge opening. The crank shaft is of the center crank type and is made from a solid forging of mild steel, with cranks slotted and finished from the solid. The connecting rod is open hearth forged steel. The inner or piston pin end is provided with bronze boxes, bored and fitted to the pin, and the crank end is of the marine type, fitted with cast iron shells.

The secondary or valve gear shaft is driven from the main shaft by spiral gears, which are incased in a cast iron hood, the upper part of which prevents their throwing oil, while the lower part acts as an oil cellar, in which one of the gears is immersed. Upon the valve gear shaft are placed cams provided with tempered tool steel throws, which open the inlet and exhaust valves, these

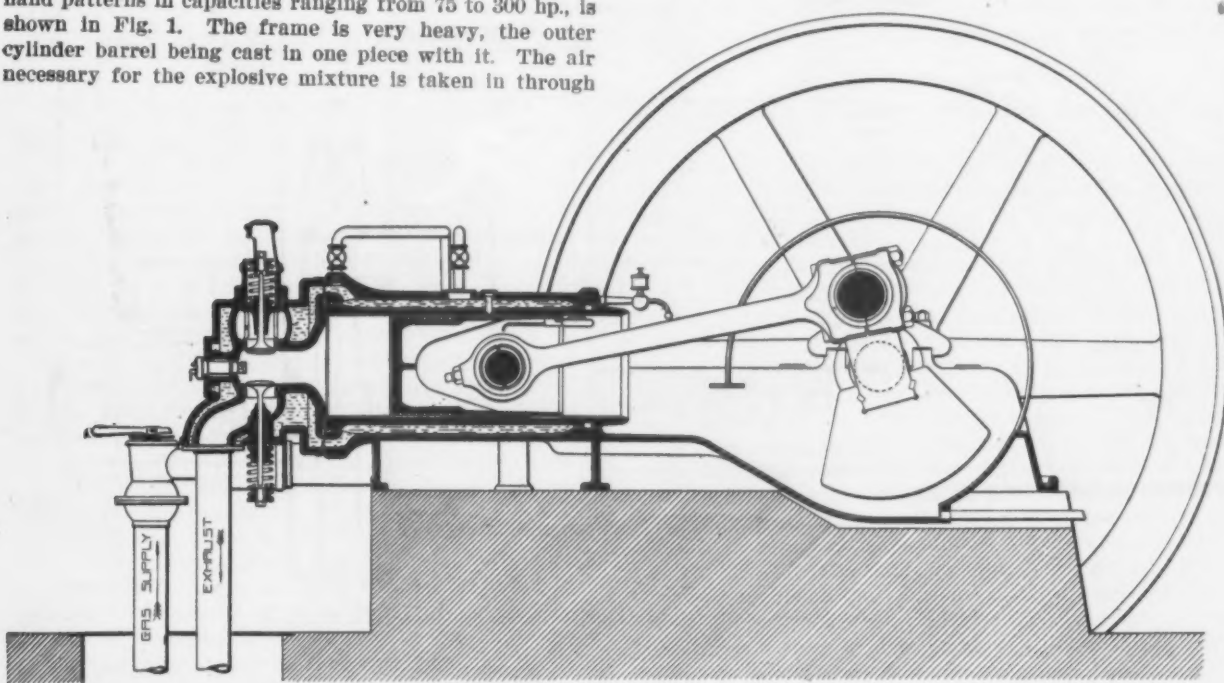


Fig. 1.—Cross Section of the Munzel Gas Engine, Built by the Minneapolis Steel & Machinery Company, Minneapolis, Minn.

the bed by a number of small openings and all suction noises are avoided. The space between the two sides of the frame is inclosed at the bottom, forming an oil receptacle which takes care of drippings from the crank, while the base of the frame is extended all around and is provided with a raised lip which effectually prevents oil from reaching the foundation.

The frame contains the main bearings, which are provided with removable cast iron shells lined with anti-friction metal. Large oil cellars are provided underneath these bearings and the oil is carried up by rings. A third bearing supports the outer end of the crank shaft beyond the fly wheel and pulley. The inner or working cylinder is a plain tube with one flange and is fastened at only one end, leaving it free to expand longitudinally, thus avoiding strains and insuring perfectly tight joints.

The piston, being long and of large surface, serves also as the cross head, while the length of the connecting rod helps to reduce the pressure per square inch upon its surface. The piston pin, which is of hardened and ground nickel steel, has a taper fit in hubs in the piston, being held in place by a feather key and locknut.

In the cylinder head casting are located all of the valves and the sparking device. On the upper side is the

being closed by spiral springs. The shaft also has a small crank on its extreme end, which oscillates the igniting apparatus. The latter consists of a magnet having an oscillating armature and heavy hardened, permanent steel magnets. The contact points are carried through a removable plug into the compression chamber, and the mechanism which oscillates the armature breaks the contact of these points and produces the spark. The time of ignition can be adjusted by a hand wheel while the engine is running, this being an essential feature in starting the engine. The quantity of air admitted is controlled by a butterfly valve placed close to the engine and operated by a short lever. The gas and air are brought together in a mixing chamber before they reach the governor valve. The air enters this mixing chamber in a number of places, which causes it to thoroughly mix with the gas.

The governor is of a spring type in which the centrifugal force of two weights is opposed by a spiral spring, and closes or opens a throttling valve which governs the amount of air and gas admitted to the inlet valve. The latter opens on the lowering of the governor and closes when it is raised, and so varies the amount of the explosive mixture admitted to the cylinder in accordance with the load.

The engine is equipped with two safety devices, one preventing the unintentional ignition of any explosive mixture that may be left in the cylinder, and the other automatically closing the air supply pipe at a point close to the mixing chamber when the engine stops. It consists of an electric contact arrangement connected to the gas valve in such a way that the electric current passing to the igniter is interrupted the moment the gas valve is closed.

The oiling devices are numerous and well distributed, the cylinder receiving its oil from a small pump driven

producer when starting the fire and a gasoline engine for driving the air compressor and blowers.

The gas producer shown in Fig. 2 comprises the generator proper, a vaporizer and the purifying apparatus. The generator is a cylindrical steel shell lined with fire brick and provided with a grate. Its cover consists of a head piece carrying the coal hopper, on which are mounted the charging lid and closing device for the hood valve. The scrubber is a cylindrical tank filled with coke, over the top of which a spray of water plays. In large installations or where extensive purification is desired, a second or dry scrubber is installed.

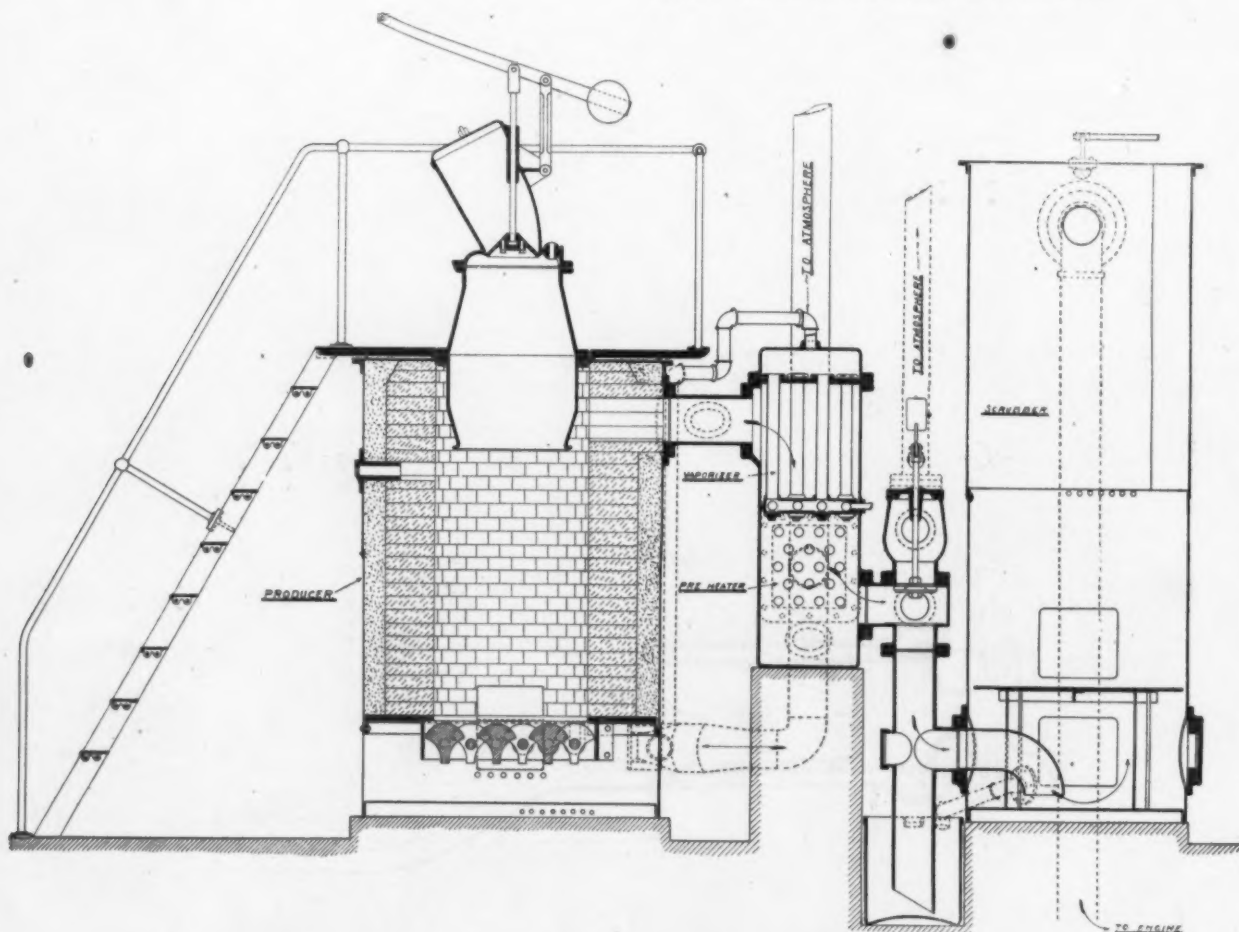


Fig. 2.—Cross Section of the Munzel Gas Producer, Vaporizer and Scrubber.

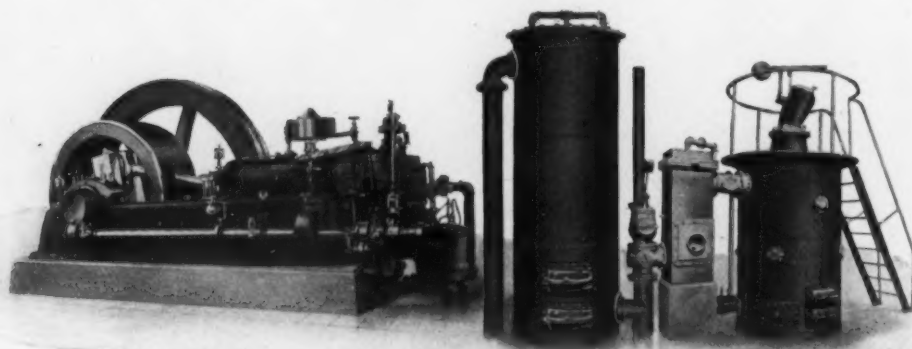


Fig. 3.—A Complete Munzel Gas Producer and Engine Plant.

from the secondary shaft, a sight glass being provided for observing the rate of feeding. The oil for the crank pin boxes is automatically fed into a ring cup surrounding the shaft and fastened to the crank arm, from which by centrifugal force it is carried through the oil pipe to the crank pin. The flywheel is of the square rimmed type and of a diameter consistent with proper rim speed.

The accessories for the system consist of a small air compressor to be used for starting the engine, a circulating pump for circulating water to cool the engine cylinders, a blower for forcing draft through the bed of the

The vaporizer is a rectangular tank placed between the producer and scrubber. The hot gases coming from the producer flow around vertical tubes containing water, to which they impart their heat, and the steam thus produced is conveyed by pipes to the producer, entering under the grate. In the bottom half of the vaporizer is a second set of tubes connected with the atmosphere on one side by a pipe and on the other side with the producer below the grate; the air in passing through the vaporizer takes up heat from the gases which would otherwise be lost in the scrubber. In smaller sizes the

vaporizer is in the shape of a pan forming the top of the producer and receives its heat from the hot gases leaving the fuel bed immediately below. A water supply pipe and an overflow pipe are connected to it, generating the necessary steam, and this, together with the air, is conveyed to the under side of the grate by pipes which pass down through the fire brick lining, superheating the air and steam.

The expansion tank serves as a small reservoir, and is placed close to the engine, its function being similar to that of a receiver over the throttle valve of a steam engine, reducing the speed of the gas from the scrubber at the moment the admission valve opens. It also helps to control the inertia of the gas at the instant the inlet valve closes, in which way it to some extent regulates the fluctuations of draft on the producer. It also allows the gas to deposit any moisture that it may have carried over from the scrubber. After the producer has been placed in operation the suction stroke of the engine creates the necessary draft. The fuel usually used to operate this producer is anthracite pea coal, although charcoal is recommended. It is also claimed that gas house coke will give nearly the same economy as charcoal or anthracite. A complete plant installation is shown in Fig. 3.

### The Effect of Duration of Stress on Wood.

The United States Department of Agriculture, Forest Service, in Trade Bulletin No. 10, says:

It has been established that a wooden beam which for a short period will sustain safely a certain load, may break eventually if the load remains. For instance, wooden beams have been known to break after 15 months under a constant load of but 60 per cent. of that required to break them in an ordinary short test. There is but little definite and systematic knowledge of the influence of the time element on the behavior of wood under stress.

This relation of the duration of stress to the strength and stiffness of wood is now being studied by the Forest Service at its timber testing stations at Yale and Purdue universities. To determine the effect of constant load on the strength of wood a special apparatus has been devised by which tests on a series of five beams may be carried on simultaneously. These beams are 2 x 2 in. in section and 36 in. in length, each under a different load. Their deflections and breaking points are automatically recorded on a drum which requires 30 days for one rotation. The results of these tests extending over long periods of time may be compared with those on ordinary testing machines, and in this way safe constants, or "dead" loads, for certain timbers may be determined as to breaking strength or limited deflections.

The experiments of the Forest Service show that the effects of impact and gradually applied loads are different, provided that the stress applied by either method is within the elastic limit of the piece under test. For example, a stick will bend twice as far without showing loss of elasticity under impact, or when the load is applied by a blow, as it will under the gradually increasing pressure ordinarily used in testing. These experiments are being extended to determine the general relations between strength under impact and gradual loads.

Bending and compression tests to determine the effect of the speed of application of load on the strength and stiffness of wood have already been made at the Yale laboratory. The bending tests were made at speeds of deflection varying from 2.3 in. per min. to 0.0045, and required from 20 sec. to 6 hr. for each test. The woods used were long leaf pine, red spruce and chestnut, both soaked and kiln dried. From the results are obtained comparable records for difference in speeds in application of load. A multiplication of the results of any test at any speed by the proper reduction factor, derived from these experiments, will give equivalent values at standard speed. The tests also show concretely the variation of strength due to variations of speed liable to occur during the test itself. The results plotted on cross section paper give a remarkably even curve as an expression of the

relation of strength to speed of application of load, and show much greater strength at the higher speeds. A numerical expression of the law, averaging all species, both wet and kiln dry, gives the following table:

Minutes to move crosshead 1 in.	—Ratios of ultimate strength.—	
	Compression.	Bending.
900	100	100
350	100.8	100.9
150	102.3	107.3
40	106.9	110.1
5	113.8	118.7

The first column, which gives the number of minutes required to move the cross head of the testing machine over the space of 1 in., is the reciprocal of speed. The second and third columns give the effect of this increase of speed upon compression and bending, respectively, and show that strength increases with speed. The strength at the lowest speed is arbitrarily fixed at 100 as a convenient basis for comparison. The ordinary bending test speed for small specimens is 1-10 in. per minute, or, reciprocally, 10 min. are required to move the cross head 1 in.

It is a common belief among polemen that the continual vibrations to which telephone poles are subjected take the life out of the wood and render it brash and weak. Nothing is definitely known as to the truth or falsity of this idea. Tests will be undertaken to determine the effect of constant vibration on the strength of wood.

### The Efficacy of Blast Furnace Gas Washing.

Marcus Ruthenburg, formerly of Philadelphia, who has been in London for some time, writes to *London Engineering*, as follows, of an experience in the use of blast furnace gases in engines:

"Furnace practice in America and Europe differs materially in temperature of blast, ore analysis and speed of driving; therefore, in the quality of effluent gases. In Europe it is not considered extraordinary to drive large gas engine units with blast furnace gas, while in America it is the exception, and those that have done so in America have done so with very indifferent success. To my mind this divergence in experience is due to the thorough cleansing of the gas in European practice, and the want of it in American practice; and upon this point I want to give an experience in the United States, and offer what appears to me as an explanation. A Westinghouse three-cylinder engine, with cylinders 15 in. in diameter by 22-in. stroke, was run on blast furnace gas that averaged about 100 B.t.u. per cubic foot. The gas for the supply of this engine came from a blast furnace, passing through the ordinary downcomers and dustcatchers, then through four washers and scrubbers and a meter, delivering to the engine. A sample taken next to the engine at any time was practically free from suspended matter.

"A continuous run of three weeks necessitated taking the engine down, new rings, and dressing of the cylinders. We then found the ports, which were properly  $1\frac{1}{4}$  in. wide, narrowed down to little more than  $\frac{3}{8}$  in., due to a glassy incrustation that had to be chipped out with tools. Upon analysis this incrustation was found to contain every element that had been in the blast furnace charge. The gas having tested free of suspended matter, whence comes this deposit? My explanation is that the various elements of the furnace were dissolved in CO as carbonyls. These carbonyls were true solutions in CO, and, therefore, not suspended matter, and not to be removed by filtering or washing. Upon explosion, in which the carbonyls took part, the metals were deposited as oxides in the glassy scale mentioned above."

**Foundry Mixtures.**—In *The Iron Age* of November 15 was printed a paper entitled "Foundry Mixtures," read by Dr. Bradley Stoughton before the Pittsburgh Foundrymen's Association. Dr. Stoughton calls attention to an error in the figures as printed under the heading, "Sulphur and Manganese." The statement was made that "iron takes up about 0.35 per cent. of sulphur in the cupola." The percentage should be 0.035.

## A New Method of Rolling Round Bars.

Every rolling mill man knows that to roll a bar of perfectly circular section is one of the hardest tasks that can be set him, while for many finished articles there is a constant demand for such rounds. In the old method of hand rolling it was necessary to put the piece several times through the last pass, each time turning it through an angle of 90 degrees to remove the bulge caused by the foregoing passage. Furthermore the roller had to hold the piece with his tongs to prevent its falling over, so that only comparatively short bars could be rolled. As a consequence this method was very slow and to increase the production the use of guides was introduced.

It is clear that if guides are used the bar entering the finishing pass cannot be circular, as in the old process, but must be oval in form if the guide is to hold the bar vertical. Guides are usually made in two parts, as shown in Fig. 1. Their use overcomes all the disadvantages of hand rolling, but necessitates a total disregard of the rule that the work of the last pass should be made as light as possible in order to obtain a regular section.

If too much pressure be applied in the last pass, the finished product will have sides similar to those shown in Fig. 2, this result being due to the uneven "spring" of the rolls and vibrations of the bearings, spindles, &c. The effects of inequalities of temperature are also much more pronounced with high pressure. From this it will be

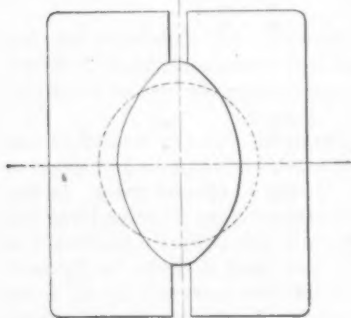


Fig. 1.—Usual Form of Guides, Showing Two Parts.



Fig. 2.—Shape of Bar Rolled with Too Much Pressure.

seen that the oval of the guide must not be too tapering if perfect rounds are wanted, but, on the other hand, if they do not taper enough they cannot fulfill their function of holding the piece vertical. To avoid simultaneously both of these evils is an object which many rolling mill men have pronounced unattainable.

A new patented process for rolling this section, described by its inventor, W. Tafel, Nuremberg, Germany, in *Stahl und Eisen*,\* consists of passing the oval guide through two successive round passes. The oval guide is thus enabled to hold the bar in the second of the two passes, although it is already of circular section when it enters the pass. The arrangement, as shown in Figs. 3 and 4, in plan, elevation and section, consists of two vertical rolls, *a*, which rotate easily in a small housing. The latter is placed in front of the finishing rolls and bolted to the rest bar. On leaving the last pass, which, together with the guide, is the same as in the usual type of guide mill, the bar passes through two guards, *b*, Fig. 5, each of semicircular section, which, fitting closely over the piece, conduct it to the round pass in the vertical rolls. The force with which it leaves the horizontal rolls is sufficient to push it through the additional pair, which are not driven. The object is thus attained of rolling with guides and at the same time putting the minimum of work on the piece in the last pass, the result being that the product is kept to size with an accuracy hitherto unattainable on a guide mill.

Of the two vertical rolls, one is firmly fixed in its bearings, while the other can be raised or lowered by means of a wedge. The upper bearings are lubricated from the side, the lower through holes in the shafts, on which the rolls are keyed. Beside the vertical movement

a lateral one is provided for the same roll by means of screws acting together through the gears *c*. This lateral movement is necessitated, not only to set the rolls to gauge, but also because the end of the piece, having left the horizontal rolls, has no power behind it and it is therefore sometimes necessary to separate the two verticals in order to pull it through. With a little practice, however, the roller soon learns to give the secondary rolls just enough draft so that the inertia of the piece will

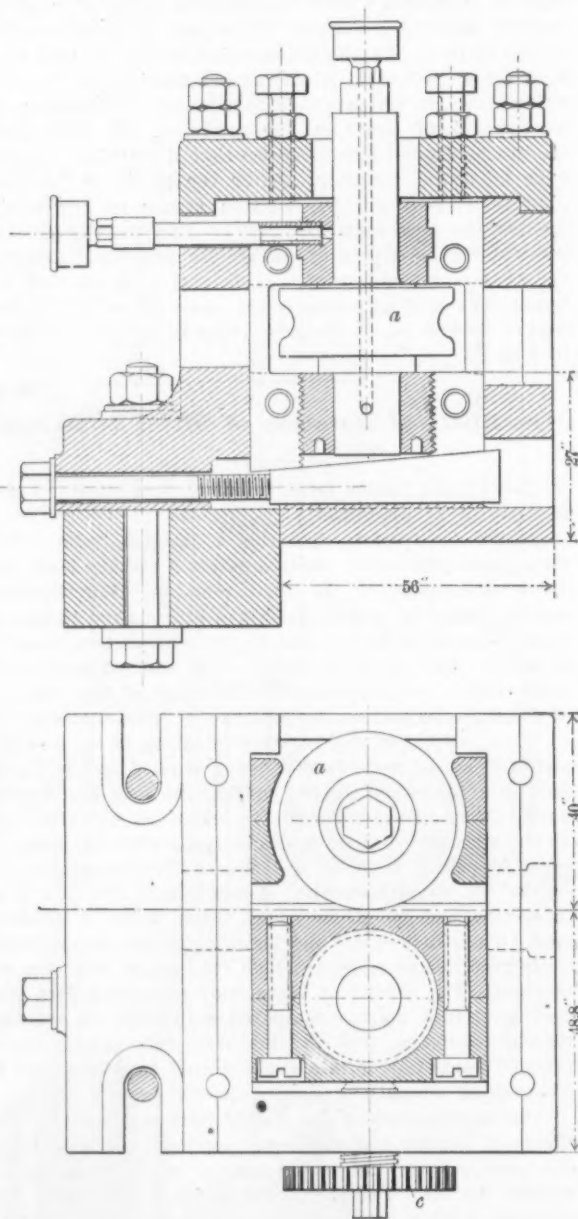


Fig. 3.—Horizontal Section and Plan of the Tafel Round Bar Mill.

carry the last end through. The semicircular guards must be accurately fitted so that they do not press on the round bar, while at the same time the latter must not have any play or its easy passage through the verticals will be jeopardized.

As it is desirable to keep these guards, which also act as guides, as short as possible, they are, when the mill is set up, very inaccessible. For this reason the gauge or templet, shown in Fig. 6, is made use of, at any rate until the workmen become sufficiently skilled to dispense with the same. When rolling begins this gauge is bolted to the rest bar back of the horizontal rolls, the bottom guard lying on it. A test piece put through shows at once whether the guard is set accurately, and if such is not the case it is lined up in the usual manner. The correct location having been found it is marked on the rest bar, the gauge is removed and the vertical roll housing substituted. As the dimensions of the latter correspond exactly with those of the gauge, it follows that the guards will set precisely as they should. This method has been

\* Issue of October 15, 1906.

found to work well, but after a little practice a good roller will set the verticals by sight, aided by a test bar held in the rolls, with such accuracy that the first piece will come through the mill exactly true to gauge.

Some of the practical results obtained with the new process at the Nuremberg Iron Works in the last two years are as follows: Formerly rounds to be used for making bolts in the sizes between  $\frac{3}{8}$  and  $1\frac{1}{4}$  in. could

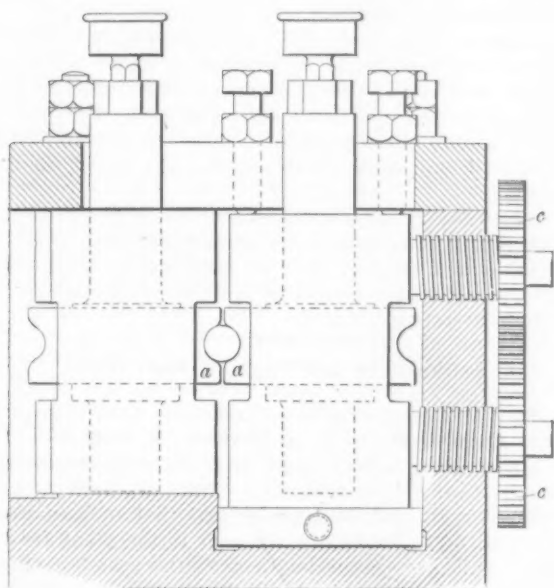


Fig. 4.—Vertical Section of the Tafel Round Bar Mill.

not be rolled unless 0.5 mm. (0.02 in.) leeway were allowed—that is, if the product was supposed to measure 16 mm. (0.630 in.) in diameter, it actually varied from  $15\frac{3}{4}$  to  $16\frac{1}{4}$  mm. Every piece was gauged and if not within these limits was either rejected outright or used for other purposes, and this was the case with about 30 per cent. of the output, if the inspection was at all strict. The above refers to rolling from bundled scrap, but even when the raw material was steel billets rigid inspection often resulted in the rejection of 10 to 30 per cent. Since the introduction of the new process limits of 0.3 mm. (0.012 in.) have been kept without

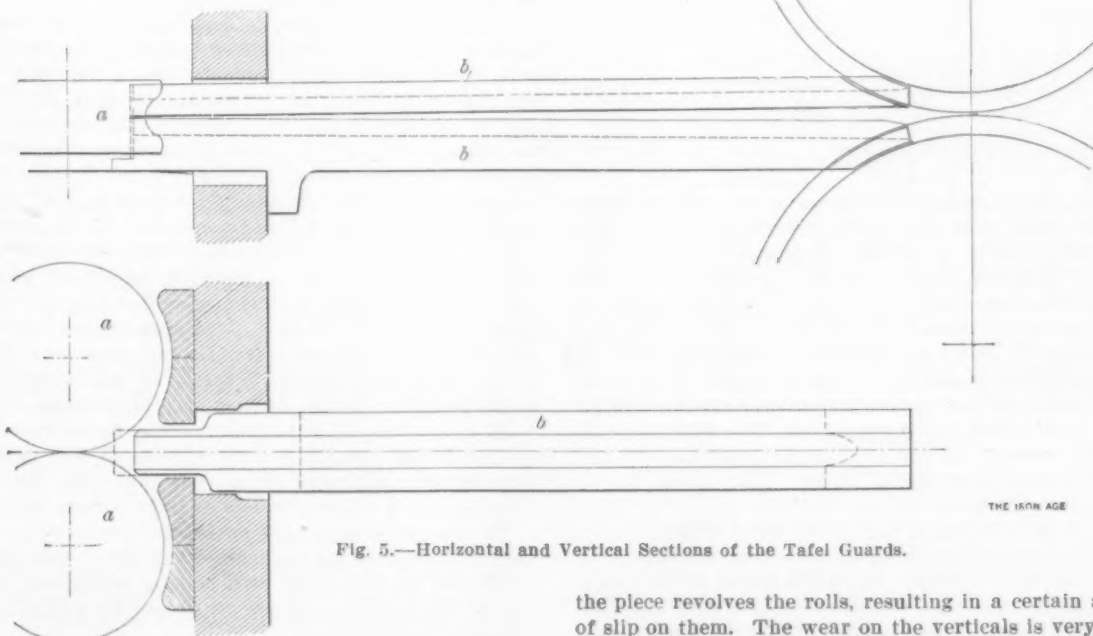


Fig. 5.—Horizontal and Vertical Sections of the Tafel Guards.

trouble, while the rejections have decreased to 3 or 4 per cent. Many turns have been worked in which 12 tons of bolt iron have been rolled from scrap, with rejections from all causes only amounting to 100 to 200 lb. In such turns most of the bars will not show variations of more than 0.008 in. For bolt making, one of the chief advan-

tages of the process is that bars which exceed the upper limit in size cannot be made, whereby stickers in the bolt machine are avoided. Careless rolling can cause too light bars, but none which are too heavy, for the latter

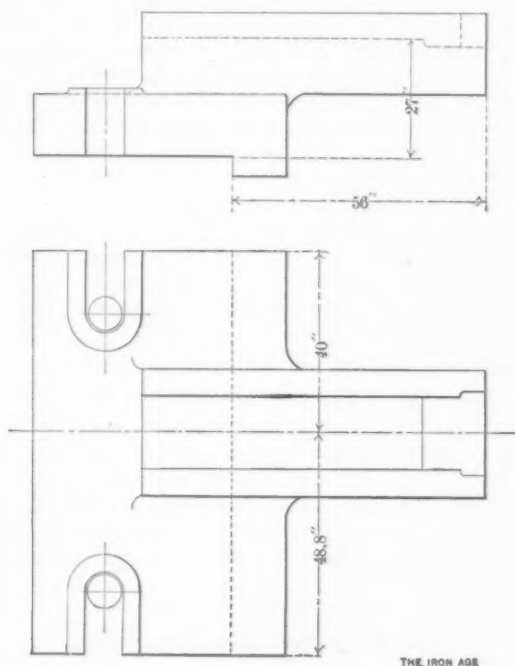


Fig. 6.—The Gauge or Templet Used.

will either be reduced to size in the guide, or, if too big will remain sticking therein.

A further advantage of the apparatus is that the verticals give the product a very smooth surface by reason, first, of the light pressure, and second, of the fact that

the piece revolves the rolls, resulting in a certain amount of slip on them. The wear on the verticals is very slight, provided they are well supplied with water.

Another evil which is overcome by the new process is the fact, well known to every rolling mill man, that with the best of work there will be a difference in size between the two ends of a bar. In Fig. 7 B 1 will be greater than B 2 and H 1 will be smaller than H 2. The effect of the vertical rolls will naturally be to correct these

differences, which, especially in long bars, are considerable.

It is as necessary in the new process as in the old that the rolls be properly lined up, for the verticals cannot make the section exact unless it is approximately so already. Careful rollers are needed, but no more careful than in the old process. The same roller can, with the aid of verticals, roll a much more exact product than without them. Special skill is only necessary when the use of the setting gauge is to be dispensed with, or when special stress is laid on never opening the verticals to

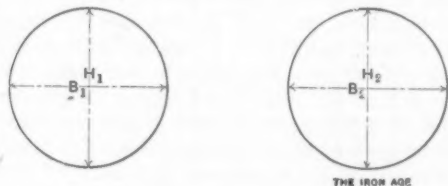


Fig. 7.—Front and Tail Ends of a Bar.

pull out the tail end. If these aids are used any roller can learn to use the apparatus in his first turn.

Finally, the process is applicable to other sections, such as squares, to obtain all four corners sharp, and for angles to obtain full corners without seams. These uses are now being tried.

### The Projected Big Battleship.

WASHINGTON, D. C., December 18, 1906.—In conformity with the provisions of the last annual naval appropriation bill, the Secretary of the Navy has sent to Congress the plans of the battleship therein authorized and which must be approved before a contract for its construction can be let. The principal characteristics of the design submitted for approval are described by the Secretary of the Navy as follows:

Specifications:  
 Length on load water line (about).....510 ft.  
 Breadth, extreme, at load water line (about).....85 ft. 2½ in.  
 Displacement on trial, not more than.....20,000 tons.  
 Mean draft to bottom of keel at trial displacement.....27 ft.  
 Total coal bunker capacity (about).....2,300 tons.  
 Coal carried on trial.....1,000 tons.  
 Feed water carried on trial.....66 tons.  
 Speed on trial.....21 knots.  
 Armament:  
 Main battery—  
 Ten 12-in. breech-loading rifles.  
 Secondary battery—  
 Fourteen 5-in. rapid-fire guns.  
 Four 3-pounder saluting guns.  
 Four 1-pounder semiautomatic guns.  
 Two 3-in. field pieces.  
 Two machine guns, caliber 0.30.  
 Two submerged torpedo tubes.

"The hull is protected by a water-line belt of armor 8 ft. in width, whose maximum thickness is 11 in. and whose cross-section is uniform throughout the length of the belt. This belt armor gives effective protection to the boilers, machinery, and magazine spaces, and, most important of all, for vessels of this type centers of gravity are necessarily very high, affords in connection with the casemate armor an extensive compartmental subdivision, a reasonable assurance of the maintenance of the stability of the vessel under battle conditions. The side above the main belt armor is protected by armor 7 ft. 3 in. wide and of a maximum thickness of 10 in. This armor is likewise of uniform cross section throughout, and in length is only slightly less than that of the main water-line belt armor. Above the main casemate armor amidships the side is protected by armor 5 in. in thickness, which affords protection to the smoke-pipes, the major portion of the secondary battery of 5-in. guns, and the hull structure.

"With particular reference to the offensive qualities of the proposed design, it may be noted that the arrangement of the main battery guns is such as to permit a broadside fire 25 per cent. greater than that of the broadside fire of any battleship now built, or, so far as is known, under construction, and the average elevation of the axes of these guns above the water line is believed to

be greater than that of any known battleship, thus affording a distinct advantage in long-range firing under all conditions of weather.

"In this connection it may be noted that the percentage of weight allotted to hull and armor is markedly greater than the percentage of such weights allotted to similar purposes in the largest battleship now in existence, and the actual total of such weights is, in the proposed design, approximately 3,000 tons greater than in the largest battleship so far built.

"The design provides for a trial speed of 21 knots, and can be arranged for the installation of either reciprocating or turbine machinery, outline specifications for both types of machinery having been prepared. Provision is also made for the stowage of a large amount of oil fuel without in any degree reducing the capacity of the coal bunkers."

The detailed plans and specifications of the battleship have been transmitted to Congress under seal, and it is probable that they will not be made public until, when approved, they are furnished to prospective bidders for their information.

W. L. C.

### Stokers in an English Rail Mill.

In the description of the Cargo Fleet Iron Company's plant, given in *The Iron Age* November 8, 1906, under the title, "A New English Rail Mill," it was erroneously stated in the last paragraph that the boilers were equipped with coal fired grates and that induced draft was used. The 10 Nesdrum boilers in the plant for the rolling mills are equipped with 20 Erith's grateless under feed stokers, and fan draft at slight pressure is supplied to the closed ashpits by two large steam fans with self-oiling engines, built for the Erith's Engineering Company, Limited, London, which made the installation, by the American Blower Company, Detroit, Mich. Erith's stokers are made under patents corresponding to the Jones underfeed stokers as made in this country by the Underfeed Stoker Company, Chicago.

These 20 Erith's stokers have been working day and night for a year with satisfactory results, it is claimed, both as regards capacity, fuel efficiency and upkeep. No grates whatever are used, and the furnace setting is extremely simple, no coking arch being required, because the combustion is completed within the burning fuel itself. The Nesdrum boilers are of the vertical type straight tube water tube boilers, built by Richardson, Westgarth & Co., Limited.

In an official test recently made of one of the Nesdrum boilers at the Cargo Fleet Iron Company, as fitted with two Erith's grateless underfeed stokers, the boiler was run for eight hours at its normal capacity of 550 hp. and for an equal period it was forced 25½ per cent. above its normal rating. The steam pressures for the two runs were, respectively, 170 and 175 lb., the equivalent evaporations at 212 degrees per square foot of heating surface 4.54 and 5.8 lb., and per pound of coal 9.82 and 8.46 lb. The degrees of superheat were 66 and 93½ and the factors of evaporation, including superheat, were 1.2 and 1.217. The coal burned per square foot of furnace area was 22.4 and 33.15 lb. No economizers were used and the boiler efficiencies for the two runs were 76 and 65 per cent. respectively. Practically no smoke was to be noticed even at the highest rate of burning, but the forcing test showed that when burning 50 per cent. more coal, although equally perfect combustion was obtained, only 28 per cent. more steam was produced, indicating the economy of running boilers at their normal capacities.

Erith's grateless stokers are reported to be very widely used in Europe on all kinds of boilers, being quite as successful on the internally fired boilers, which are so popular in England, as they are on water tube and other externally fired boilers.

The Railway Steel Spring Company announces that the bonds recently issued were for the purpose of making improvements in its plants. It is stated that improvements now under way at the Latrobe Works will increase the annual capacity of the plant from 36,000 to 90,000 tons.

## Reinforced Concrete Structures.

### The Corrosion of Reinforcing Metal.

In view of the serious corrosion of the metal in reinforced concrete floors made up of cinder concrete, as found in a number of wrecked buildings in San Francisco, the Structural Association of that city appointed a committee of investigation. The committee's report recommends an amendment of the building laws so as to exclude the use of cinder concrete in floor slabs or for fire-proofing. Professor Norton advised coating the metal with a paint of neat cement or dipping the metal in a thin grout. This the committee considered hardly practicable in San Francisco and thought it doubtful if it could be done with the thoroughness such work demands. The report discusses the causes of corrosion, stating that the concrete was found somewhat porous, with occasional voids, and contained coal ranging from dust up to lumps of  $\frac{3}{4}$  in. diameter. Rust spots occur in the concrete and where such spots are in contact with the metal the corrosion is severe. It was certain, in the committee's judgment, that no water had reached the concrete since the fire of April 18. The conclusion was, from the extent of the corrosion, that the floors would not have supported their loads more than two or three years longer. The report says in part:

#### Causes of Corrosion.

Various reasons for the corrosion of metal in cinder concrete have been given. Prominent among them is the belief that it is due to sulphur in the cinders. In order to corrode metal the sulphur must first oxidize to  $H_2SO_4$ , and if there is any notable amount of sulphur present it would be absorbed by the cement. It is not probable that sulphur can corrode metal unless it is either close to it or the concrete is very deficient in cement.

Professor Norton made several hundred experiments, and it is his opinion that the corrosion is not due to sulphur, but to a too dry mixture, which fails to coat the metal properly, and air and moisture enter the pores of the concrete and set up rusting action. This view is also confirmed by Booth, Garrett & Blair, who state that a cinder containing 0.2 per cent. of sulphur will not corrode steel, provided the concrete has sufficient cement mortar to close up the voids and cover the metal.

It is stated by makers of sheet metal pipe that there is a marked difference in the life of pipe that comes to San Francisco by rail or by sail. The exposure to a sea voyage renders the usual protection by dipping useless, as the surface rusts under the dip and the coating falls off the pipe. The pipe makers state that this happens to sheets apparently unaffected by rust when dipped. Slitting and expanding the metal sheets in manufacturing expanded metal may cause minute cracks upon the surface of the metal. If this be combined, as in the case here, with a thin slab of concrete, porous and ranging in thickness from  $2\frac{1}{4}$  to  $4\frac{1}{4}$  in., with the metal in many cases flush with the bottom of the slab, there is an ideal condition for the rusting of the metal.

Hambuechen (Univ. Wis.) made a study of corrosion and has proved that a point of segregated carbon is always an initial point of corrosion, and has shown that burnishing steel or iron protects it, notably by removing the focal points; he has proved that rusting sets up a feeble current, the segregated carbon points acting as poles. Possibly the presence of much free coal and coke in the cinder may be a contributing cause, by setting up feeble electric currents or by conveying them from earth currents due to leaks from trolley wires.

In the Rialto Building the upper floors are of sound rock concrete, and where the Johnson bars are exposed they are free of rust and appear to be in the same condition as when placed there.

The Bullock and Jones Building, a ten-story structure, had all its floors of rock concrete and expanded metal. During the repairs of the steel frame it was necessary to remove quite a number of floor panels and the metal was found in as good condition as when placed. The foreman who removed the floors told us that he had only observed two slightly rusted places, which rusting he thought had occurred prior to its being used in the floor.

#### Other Testimony.

The committee cited the testimony of various persons who had been consulted. Thos. W. Brooks of the National Tube Company, San Francisco, quoted a number of cases of corrosion where pipes, both cast iron and steel, laid in cinder filled streets in Pennsylvania, were destroyed in a short time. This was so marked in the case of natural gas lines that they required a clay filling of at least 12 in. to surround the pipe, where laid in cinder fills, to protect them from pitting. In a book compiled by the National Tube Company for its private use a number of similar cases were noted. All of this seems to indicate

free sulphuric acid in a very dilute form as the destructive cause. C. F. Wieland made the following comment:

"That the poultry netting in use in the Wells-Fargo Building is not more visibly corroded is doubtless due to the fact that in the process by which wire is successively drawn to its final gauge from the rod a skin is given it which insures it a longer life than rolled sheet metal subsequently sheared. Some specimens I have of the netting in question show corrosion. Rolled sheets may have the same physical and chemical characteristics as possessed by the rod out of which the wire for poultry netting is drawn, but the subsequent shearing surely lays bare the 'vitals' of the sheet to more ready attack by the elements of corrosion than would be the case with the frequently drawn wire. I contend against the use of any iron or steel in contact with cinder concrete, and I believe it no easy task to find cinder free of coal and other corrosive elements."

### Recent Failures of Reinforced Concrete.

Discussing the causes and lessons of recent failures of reinforced concrete, the *Engineering News* points out that the designer usually charges bad workmanship, while the executing force tells of faulty design:

The designer or designers say, unqualifiedly, that the force of workmen or their foreman was at fault: that the concrete was of improper quality, or the reinforcement was not placed where directed, or care was not taken to bond together the several sections of concrete, or the green work was overloaded, or the centering was removed too soon. One or more of these defects has been given as the cause in every instance of such failures. . . . The fact that the men of most experience are in the contracting ranks and hence are either partisans or opponents of the contractor whose work collapsed, doubtless militates against the calling of experts to pass on the design. As a matter of fact we know of not one case in this country where the public investigation of a reinforced concrete failure involved serious study of the design, or resulted in impeaching the sufficiency of the design. It is only in the rarest cases that a courageous private investigator lays bare the design (as did for instance D. B. Luten in the case of a small reinforced concrete highway bridge) and shows that incompetence or criminal skimping is evident, and that the failure may be explained without invoking the threadbare excuse of improper workmanship.

#### Time to Call a Halt.

Our contemporary takes the position that "If we cannot, or commercially do not, obtain such a grade of labor as to erect safely our designs of reinforced concrete structures, or if we do not, or will not, design our structures with ample strength to permit of safe erection by the commercial grade of labor, then it is indeed time to call a halt." The following significant summing up is then made:

The observed facts impel the lay reader to one definite conclusion: That reinforced concrete is a dangerous building material, dangerous for unknown reasons, among which may be these: either (1) because safe methods of design have not yet been developed, or (2) because the commercially obtainable materials of construction are subject to unknown variations which may produce fatal weakness, or (3) because the quality of labor employed is not high enough to insure the safe construction of the design, even though design and materials be satisfactory. To this conclusion we are regretfully forced to subscribe. We make but one reservation—namely, that if an independent engineer be employed to either work out the design, or to prescribe specifications and verify the design by them; and if further an independent engineer be placed in charge of the construction work to see that it is properly done, then reinforced concrete construction is as safe as other types of construction. Under all other circumstances we believe it involves so much risk that it must be characterized as dangerous.

Admiral Mirabello, Minister of Marine, announced in the Italian Chamber of Deputies at Rome, December 14, that the Italian armor plate factory at Terni had accepted a contract to provide the navy with 6000 tons of armor at the same price as that at which the Midvale Steel Company of Philadelphia undertook its contract for the Italian Government. This announcement shows that the contract with the American company has had the effect of forcing the Italian company to lower its prices, and means a present saving to the Italian Government of \$80,000. The Italian Government has ordered the construction of another battleship of 15,000 tons, and when it is completed others of the same class are to be ordered, as it has planned to form a new naval division of modern ships.

## The Chemical Composition of Tool Steel.\*

### The More Important Characteristics of High Speed Tools.

The best tool steel should be capable of producing high speed tools of the following qualities or characteristics:

a. Tools should be of such composition that comparatively small errors or imperfections in the heat treatment will not seriously injure them and thus render them irregular in their cutting speeds. That is, the steel should be of that composition from which it is easy to make uniform tools.

b. Tools should not fire crack easily from the heat treatment.

c. Tools should be capable of running at the highest standard speed in cutting either hard, medium or soft steel; or hard, medium or soft cast iron.

d. Tools should be difficult to ruin on the grindstone or through overheating in the lathe.

e. Tools should be tough in the body—i.e., not liable to break in use even when receiving severe jars or blows from the work.

f. Tools should be capable of taking fine feeds in cutting hard metals with proportionally high cutting speeds as when taking coarse feeds.

g. Tools should be easy to dress or shape without requiring very high heat.

h. When injured through use in the lathe, the quality of the tool steel should be such that the injury can be repaired by grinding off as small amount as practicable from the tool.

No tool steel has yet been developed which possesses all these qualities in the highest degree. It is, however, a most interesting and useful fact that the tool steel marked No. 1 in the accompanying Table I possesses all except two of these qualities in as high a degree as any steel that we have tested. The two defects possessed by this steel are that it is rather difficult to forge into a tool, and although it is very tough in its body, it is not as tough as tools whose bodies are either annealed or partially annealed.

be found its standard speed, 20 min. duration, 3-16 in. depth of cut, 1-16 in. feed, in cutting:

a. Medium tool steel, about 0.34 per cent. carbon, 73,000 lb. tensile strength, 30 per cent. stretch.

b. Very hard annealed tool steel, about 1 per cent. carbon, 100,000 lb. tensile strength, 6 per cent. stretch.

c. Very hard cast iron.

It has been our experience that a tool capable of cutting metal of these three qualities at high speeds is also capable of cutting at correspondingly high speeds almost any other quality of steel or cast iron which is softer than those given. Tools are sometimes found which will cut the very hard metals at high speeds, and yet not do proportionately well on the medium metals; but if they cut both the very hard and the medium, our experience is that they are equally good for anything softer. Many tools can be found, however, which cut softer metals well and yet fall down badly in cutting hard steel or hard cast iron.

We are just completing (October 20, 1906) a series of tests with the tools upon the forgings and castings just referred to. In addition to this we have tested in cutting the same pieces of metal the old fashioned carbon tools of the Jessop make; two Mushet tools, one used by us in our former experiments and the other an especially fine quality of Mushet tool dating back to the early 90's; also tools used by us in our experiments for developing the Taylor-White process, which resulted in high speed tools. In addition to these, we have also tested upon the same forgings and castings some of the tools used by us since the Bethlehem experiments in determining the laws for cutting metals, and some of the tools

Table I.—Chemical Compositions and Cutting Speeds of the Best High Speed Tools.

Including noted English, German and American makes experimented upon by us in the summer and fall of 1906.

Number of the tool steel.	Year in which analysis was made.	Vanadium.	Molybdenum.	Tungsten.	Chromium.	Carbon.	Manganese.	Silicon.	Phosphorus.	Sulphur.	Medium steel forg.	Hard steel forging.	Hard cast iron.
		Va.	Mo.	W.	Cr.	C.	Mn.	Si.	P.	S.	Ing.		
1.....	1906	{ 0.32	.....	17.81	5.95	0.682	0.07	0.049	.....	.....	99 ft.*	41 ft. 6 in.	52 ft.
2.....	1906	{ 0.29	.....	18.19	5.47	0.674	0.11	0.043	.....	.....	91 ft.*	40 ft.	50 ft.
3.....	1906	.....	.....	16.19	3.86	0.736	0.06	0.210	.....	.....	39 ft.†	39 ft.†	50 ft.
4.....	1906	.....	.....	14.41	3.28	0.709	0.07	0.120	.....	.....	38 ft.†	38 ft.†	49 ft.
5.....	1906	.....	.....	17.61	4.24	0.502	0.10	0.240	.....	.....	39 ft. 6 in.	39 ft. 6 in.	46 ft.
6.....	1906	.....	.....	14.23	3.44	0.739	0.06	0.165	.....	.....	39 ft.	39 ft.	47 ft.
7.....	1906	.....	.....	25.45	3.23	0.838	0.29	0.034	.....	.....	38 ft. 6 in.	38 ft. 6 in.	47 ft.
8.....	1906	.....	.....	14.91	5.71	0.790	0.06	0.060	.....	.....	37 ft.†	37 ft.†	45 ft. 6 in.
9.....	1903	0.48	.....	17.79	2.84	0.650	0.12	0.087	0.013	0.012	70 ft.†	37 ft.†	45 ft. 6 in.†
10.....	1903	.....	.....	19.64	2.85	0.760	0.30	0.090	.....	.....	37 ft.†	37 ft.†	45 ft. 6 in.†
11.....	1903	.....	.....	18.99	2.61	0.670	0.20	0.265	0.014	0.009	37 ft.†	37 ft.†	45 ft. 6 in.†
12.....	1903	.....	.....	23.28	2.80	0.800	0.11	0.165	0.015	0.009	37 ft.†	37 ft.†	45 ft. 6 in.†
13.....	1903	2.03	.....	18.93	3.52	0.580	0.19	0.125	0.029	0.016	37 ft.†	37 ft.†	45 ft. 6 in.†
14.....	1905	4.21	.....	13.44	3.04	0.760	0.09	0.052	.....	.....	37 ft.†	37 ft.†	45 ft. 6 in.†
15.....	1906	.....	.....	24.64	7.02	0.600	0.03	0.205	.....	.....	85 ft.*	38 ft.†	44 ft.
16.....	1906	.....	.....	19.97	3.88	1.28	0.14	0.220	.....	.....	84 ft.*	38 ft.†	.....
17.....	1906	.....	.....	19.16	5.61	0.79	low.	low.	.....	.....	85 ft.*	37 ft.*	.....
18.....	1906	0.28	7.60	9.25	6.11	0.32	0.13	0.081	.....	.....	86 ft.*	37 ft.*	.....
19.....	1906	.....	.....	16.00	3.50	0.70	low.	low.	.....	.....	38 ft.*	38 ft.*	.....
20.....	1906	.....	.....	16.00	3.50	0.70	low.	low.	.....	.....	34 ft.*	34 ft.*	.....
21.....	1903	.....	.....	14.71	2.90	0.700	0.12	0.196	0.017	0.010	64 ft.	34 ft.	44 ft.
22.....	1903	.....	.....	15.31	2.88	0.540	0.12	0.133	0.018	0.009	34 ft.†	34 ft.†	44 ft.†
23.....	1903	0.75	.....	14.91	2.80	0.450	0.10	0.090	0.018	0.008	34 ft.†	34 ft.†	44 ft.†
24.....	1903	.....	.....	14.62	2.81	0.600	0.18	0.323	0.017	0.009	.....	.....	.....
25.....	.....	6.25	.....	.....	4.30	0.900	0.12	0.481	0.016	0.008	.....	.....	.....
26.....	.....	.....	.....	10.68	3.67	1.160	0.10	1.340	0.024	0.008	.....	.....	.....

\* Tools marked thus were actually run in 1906 upon a 0.43 carbon forging which has a standard cutting speed as 48:60 compared to the cutting speed of the 0.34 carbon referred to in this column.

† Tools marked thus were run on another forging or casting and the cutting speeds given were judged by comparing the qualities of the two forgings or castings and the speeds of the other tools run at the same time.

‡ Tools marked thus were not run a sufficient number of times in this particular case to be certain of the correct speeds. The figures given are therefore partly estimated.

Both analyses of No. 1 make tools of practically the same cutting speed, forging hard at light cherry red. Should be forged at a light yellow, but at which heat it forges more readily than the old self-hardening steel. This is the best high speed steel with which we have experimented.

Nos. 2 to 23 are rather hard to forge.

Cutting speeds of Nos. 23 to 25 are inferior to any of the others.

In this table we give the chemical composition of various makes of tool steel now in use, and we believe that this list contains the most noted and, as far as we know, the best English, German and American brands of high speed tool steels. Opposite each make of tool will

used by us in experiments made since the Bethlehem experiments to determine the chemical composition of those high speed tools which at that time ranked first.

By referring to the table it will be noted that, while No. 1 tool is in all respects better than any of the others, yet the differences in cutting speeds are comparatively small between this tool and several of those following it.

\* From "The Art of Cutting Metals," by Fred W. Taylor, Philadelphia.

Therefore the users of tool steel cannot go far wrong by adopting any one of these noted brands of tool steel, but having once adopted a make of tool steel we would strongly advise against changing, and particularly against allowing any other steel to be used in the same shop.

#### Carbon Tool Steels.

[A study of the relations between the chemical composition of various tool steels and their cutting speeds is given in a table which we omit, showing that, as to carbon tool steels, but small differences exist in the cutting speeds of the various makes; in fact, when cutting the same quality of metal the cutting speeds do not vary more than 6 per cent.—THE EDITOR.]

Some of these analyses include several tools which are not self-hardening and yet contain tungsten or chromium, which must be hardened or tempered in the old fashioned way to be of any use; and yet to these steels have been added the two metals which when combined in sufficient quantities produce self-hardening tools. A study of the chemical compositions of these steels is chiefly interesting for two reasons:

1. Because they illustrate the fact that the presence of tungsten even to the extent of 7 per cent. produces a tool which has no more self-hardening properties than ordinary carbon steel, the reason for this being that there is but an exceedingly small amount of either manganese or chromium present; and also that a tool may contain 1.6 per cent. of chromium (an ample percentage to make good self-hardening steel if either tungsten or molybdenum were present and still have no self-hardening properties.

2. Because they show clearly that the addition of 1.6 per cent. of chromium, coupled with 0.71 per cent. of carbon (a very low carbon for a tempered tool steel) and also with 0.10 per cent. manganese (a decidedly low manganese for a tempered tool steel), gives the tool a materially higher cutting speed than that of the ordinary carbon tempered tools.

We made a very exhaustive examination of this steel, but the fact that it required more skill on the part of the blacksmith in judging its proper hardening heat than the ordinary carbon tools prevented its adoption as a standard shop tool, even although tools of this composition could be run at a cutting speed materially higher than the carbon tempered tools. When a steel, either carbon, self-hardening or of the modern high speed tool variety, shows any marked tendency to fire crack or toward brittleness we promptly abandon all idea of its adoption as standard.

by us at the Bethlehem Steel Company just prior to the discovery of the Taylor-White process while searching for the best self-hardening steel to adopt as a shop standard for that company. Many other brands of self-hardening tools had been tested previously by us as to their cutting speeds, but because of evident inferiority to the above brands were not analyzed or tested at this time. These five makes of tool steel, then, are interesting because they represent, so far as we know, the best self-hardening steels then in the market, and the only makes which we believed to be worthy the expenditure of time and money required in making careful standard speed tests on the experimental lathe. It is notable that two steels out of the five (Mushet and Firth-Stirling) depended for their self-hardening properties upon a comparatively large percentage of manganese in combination with tungsten, while three of them depended mainly upon high chromium in combination with tungsten or molybdenum. It will be observed that No. 68 (Midvale) gave the highest cutting speed, but this steel was seriously injured in the operation of heating by the blacksmith, which injury led to the discovery of the Taylor-White process. It is highly likely, therefore, that had not the high speed tools been discovered the Mushet self-hardening steel No. 68 would have been adopted by us as our standard in spite of the slightly higher cutting speed of the Midvale steel, since the Mushet steel gave evidence of overheating by the blacksmith through crumbling when hammered. Thus the Mushet tools, when injured by overheating, remained in the blacksmith shop, while overheated Midvale tools were likely to get into the machine shop and interfere seriously with the uniformity in the shop tools.

#### Analyses and Cutting Speeds of Various Tools Experimented with by Taylor and White in the Discovery and Development of the New High Speed Tools.

Table III gives the chemical compositions of various steels experimented with by us during the time of the discovery and development of the new high speed tools by Mr. White and the writer. These tools are separated into various groups for the purpose of showing the relative effect of comparatively large and small quantities of each of the following elements upon the cutting speed—namely, tungsten, molybdenum, chromium, carbon and manganese.

After the columns giving the percentages of the various ingredients of which the tools are composed two columns are found, in the first of which is entered the cutting speed of the steel when given the ordinary heat treatment as practiced before our invention, and as in many cases recommended and even superintended by the

Table II.—Chemical Composition and Cutting Speeds of Various Self-Hardening and Carbon Tools Experimented with by Us Prior to Our Discovery of High Speed Tools.

	Number of the tool steel.	Year in which analysis was made.	Mo.	Tungsten.	Chromium.	C. Carbon.	Mn.	Si.	P.	S.	Medium steel forging, standard speed, not treated at a high heat.	Hard steel forging.	Very soft cast iron.
Mushet	65	1898	....	5.62	0.490	2.40	1.90	0.711	0.055	0.051	26 ft.	.....	.....
Atha and Illingsworth (self-hardening)	66	1898	4.58	.....	3.430	1.615	1.65	0.285	0.027	0.016	24 ft.	.....	.....
Firth Stirling Company	67	1898	....	7.57	0.600	2.300	3.22	0.269	0.019	0.007	24 ft.	.....	.....
Midvale Steel Company	68	1898	....	8.48	1.460	1.386	0.32	0.358	0.016	0.022	30 ft.	.....	.....
Sanderson S. H.	33	.....	....	6.83	3.940	1.470	0.37	0.770	.....	.....	.....	.....	.....
Sanderson	69	1896	....	4.48	3.955	1.512	0.31	0.233	0.017	0.023	27 ft.	.....	.....
Midvale (self-hardening)	70	1894	....	7.723	1.830	1.143	0.18	0.246	0.023	0.008	25 ft. 8 in.	10 ft. 11 in.	89 ft.
Mushet (self-hardening)	71	1894	....	5.441	0.398	2.150	1.578	1.044	.....	.....	25 ft.	7 ft. 9 in.	86 ft.
Sanderson (self-hardening)	72	1894	....	4.537	2.410	1.400	0.324	0.216	0.018	0.006	24 ft. 10 in.	8 ft.	81 ft.
Jonas & Colver (self-hardening)	73	1894	....	10.721	2.958	1.850	2.325	1.027	.....	.....	21 ft. 6 in.	6 ft. 10 in.	.....
Burgess special (self-hardening)	74	1894	....	7.599	0.074	2.320	3.530	0.630	0.036	0.004	.....	.....	.....
Mushet air hardening, Pennsylvania Steel Company	75	1893	....	6.057	0.342	2.213	1.800	0.883	0.037	0.023	.....	.....	.....
Stirling Steel Company (self-hardening)	76	1893	....	8.387	0.254	1.806	1.870	0.156	0.018	0.008	.....	.....	.....
Sanderson (self-hardening)	77	1893	....	7.506	1.464	1.690	2.590	1.024	0.088	.....	.....	.....	.....
Sanderson (self-hardening)	78	1893	....	7.368	0.200	2.178	2.500	0.162	0.016	.....	.....	.....	.....
Sanderson (self-hardening)	79	1893	....	11.589	2.694	1.842	2.430	0.890	0.023	0.007	.....	.....	.....
Imperial (self-hardening), Park Bros., Pittsburgh	80	1893	....	6.923	0.675	1.732	2.520	0.250	0.019	0.014	.....	.....	.....
Sanderson (self-hardening)	81	1893	....	7.975	1.325	1.625	2.670	0.976	0.072	0.011	.....	.....	.....

Table II gives the analyses of several self-hardening tools made between the dates of 1893 and 1898, and of these Nos. 65, 66, 67, 68 and 33 were experimented with

makers of the tool steel. In the second column are entered the speeds obtained by the same tools after having been treated carefully by the Taylor-White process of

heating the tool close to the melting point, cooling it and then reheating it to about 1150 degrees F.

A study of the various groups of tools, together with their cutting speeds before and after receiving the high heat treatment, will make clear the basis of our claim in patent No. 668,269, that tools containing one-half of 1 per cent. or more of chromium and 1 per cent. or more

**The Effect Upon High Speed Tools, As Originally Developed, of Tungsten, Chromium, Carbon, Molybdenum, Manganese and Silicon.**

By examining the chemical compositions of the tools given after Nos. 26 to 35—namely, the groups of tools which after receiving the Taylor-White treatment gave

*Table III.—The Chemical Compositions and Cutting Speeds of Various Tools Used by Us in the Discovery and Development of the Taylor-White Process for Making High Speed Tools by Heating Tools Close to the Melting Point.*

	Number of the tool steel.							Medium steel forging.		Standard speed old style not treated T-W process.	Standard speed treated T-W process.	Very hard steel forging treated T-W process.	Hard cast iron treated T-W process.
		Molybdenum.	Tungsten.	Chromium.	Carbon.	Manganese.	Silicon.	Ft. In.	Ft. In.				
Recommended in patent for cutting hard steel.....	26	....	8.00	3.80	1.85	0.30	0.150	27	58	30	6	43	
Recommended in patent for cutting medium and soft metals..	27	....	8.50	2.00	1.85	0.15	0.150	31	61	19	39		
	28	....	8.76	1.75	1.30	0.39	0.395	32	6	61	5		
	29	....	8.38	1.62	1.26	0.31	0.432	..	60				
	30	....	..	2.01	..	..	..	..	60				
Better tools made during development of Taylor-White process .....	31	....	7.89	2.16	0.858	0.47	0.288	..	61				
	32	....	6.50	2.77	1.860	1.19	0.379	32	61	3			
	33	....	6.83	3.94	1.470	0.37	0.770	27	61	3			
	34	....	7.68	3.78	1.810	0.32	0.191	20	11	57			
	35	....	7.94	3.81	1.950	0.41	0.572	..	59*				
Recommended in patent for cutting hard steel.....	26	....	8.00	3.80	1.85	0.30	0.150	27	58				
Effect of high chromium.....	34	....	7.68	3.78	1.81	0.32	0.191	20	11	57			
	35	....	7.94	3.81	1.95	0.41	0.572	..	59*				
	33	....	6.83	3.94	1.47	0.37	0.770	27	61	3			
	36	....	5.48	0.290	2.02	2.25	0.274	25	6	39	3		
	37	....	7.22	0.467	2.40	3.26	0.249	26	10	37	9		
	38	....	7.57	0.600	2.30	3.22	0.269	27	5	37			
Effect of low chromium.....	39	....	7.18	0.670	2.40	3.44	0.270	20	39	10			
	40	....	8.58	0.720	0.977	0.39	0.231	20	50				
	41	....	0.83	3.80	1.80	2.19	..	27	23				
Effect of low tungsten.....	42	....	1.91	3.25	1.87	0.56	..	37	45				
	43	1.77	..	1.64	0.89	0.50	..	45†	58				
	44	0.84	..	2.01	1.02	0.53	..	27	35				
For effect of high tungsten see almost all other analyses.													
Recommended in patent for cutting hard steel.....	26	....	8.00	3.80	1.85	0.30	0.15	27	58				
Effect of high carbon.....	35	....	7.94	3.81	1.95	0.41	0.572	..	59*				
	45	....	7.94	1.45	2.44	2.91	0.908	..	56*				Hard to forge.
	46	....	8.05	2.61	2.27	0.42	0.792	..	57*				
	32	....	6.50	2.77	1.86	1.19	0.379	32	61	3			
	31	....	7.89	2.16	0.858	0.47	0.288	..	61				
	40	....	8.58	0.72	0.977	0.39	0.231	20	50				
Effect of low carbon.....	47	....	7.87	1.00	1.200	0.41	0.291	30	50				
	29	....	8.38	1.62	1.260	0.31	0.432	..	60				
	48	....	3.55	1.91	1.290	0.42	0.235	23	8	47	2		
	28	....	8.76	1.75	1.300	0.39	0.395	32	6	61	5		
Effect of high manganese.....	45	....	7.94	1.45	2.44	2.91	0.908	..	56*				Hard to forge.
	49	....	8.61	1.40	1.14	2.38	0.980	22	6				
	50	4.20	..	3.95	1.18	0.08	..	..	60				Irregular.
	51	....	8.15	1.91	1.68	0.12	0.16	32	6	55			
	52	....	8.85	1.75	1.54	0.13	0.09	..	..				
Effect of low manganese.....	53	....	8.41	3.29	1.54	0.24	0.32	25	50	6			
	54	3.67	..	3.88	1.84	0.30	0.23	27	6	60			Irregular.
	34	....	7.68	3.78	1.81	0.32	0.191	20	11	57			
	33	....	6.83	3.94	1.47	0.37	0.770	27	61	3			
	55	0.56	..	..	1.05	0.20	0.120	16	10				
	56	0.84	..	2.01	1.02	0.53	..	27	35				
	57	0.94	..	..	1.07	0.20	0.15	21	10				
	43	1.77	..	1.64	0.89	0.50	..	45†	58				
Molybdenum substituted for tungsten .....	58	2.03	4.53	2.03	2.02	1.60	0.282	31	58	4			Tendency to fire crack.
	59	2.25	4.74	2.80	2.07	1.66	0.120	36	58	4			Tendency to fire crack.
	60	2.45	..	3.19	1.22	0.66	0.240	30	50				
	54	3.67	..	3.86	1.84	0.30	0.230	27	6	60			Irregular.
	50	4.20	..	3.95	1.18	0.08	..	..	60				Irregular.
	61	4.58	..	3.43	1.61	1.65	0.285	..	59				Brittle in body and fire cracks easily.
	62	4.59	..	3.46	1.51	1.62	0.245	45	3				Brittle in body and fire cracks easily.
	63	4.60	..	3.75	1.84	1.79	0.156	45	..				Brittle in body and fire cracks easily.
To test annealing qualities.....	51	....	8.15	1.91	1.68	0.12	0.16	32	6	55			Annealed readily.
	52	....	8.85	1.75	1.54	0.13	0.09	..	..				Annealed readily.

\* The record of their cutting speeds could not be found. Speeds given from memory.

† Tools run on another forging or casting and the cutting speeds given were judged by comparing the qualities of the two forgings or castings and the speeds of other tools run at the same time.

No. 26 is considerably harder to forge than No. 27, just below.

No. 27 is easy to forge.

No. 28 was one of the lot of tools used in the first series of experiments which led to the discovery of the Taylor-White process.

The chemical composition of the forgings and castings above used was as follows: Medium steel forging—Carbon 0.34, manganese 0.54, silicon 1.76, phosphorus 0.037, sulphur 0.026. Hard steel forging—Carbon 1.00, manganese 1.11, silicon 0.305, phosphorus 0.036, sulphur 0.049. Hard cast iron—Carbon total 3.32, combined carbon 1.12, manganese 0.68, silicon 0.86, phosphorus 0.78, sulphur 0.073.

of tungsten, or its equivalent in molybdenum, are materially improved in cutting speed through the treatment by the Taylor-White process. This, however, is of minor interest. A subject of greater interest is the effect of the various elements when used in such quantities in the tool steel as to produce tools of the highest cutting speeds—that is, the highest degree of red hardness when treated by the Taylor-White process.

the highest cutting speeds during the period of our invention—it will be noted, 1, that no tool in this group contains less than 6½ per cent. of tungsten, and that the highest tungsten in this group is 8.75 per cent.; 2, that no tool in this group contains less than 1.62 per cent. of chromium, and that the highest chromium is 3.94 per cent. It would seem, therefore (as a result of these investigations), that to produce what we considered at

that time first-class tools the chromium and tungsten must be within these limits.

The effect of low tungsten will be seen by examining tools Nos. 41 to 44. In No. 42 it will be noted that with 1.91 per cent. of tungsten and 3.25 per cent. of chromium a tool was produced which improved materially upon being heated to a high heat, whereas tool No. 41, containing 0.83 per cent. of tungsten and 3.80 per cent. of chromium, deteriorated materially in its cutting speed upon receiving the high heat treatment. From this it is evident that even with high chromium more than 0.83 per cent. of tungsten is required in the tool before the property of red hardness begins to be apparent, and also that high chromium tools are injured in their cutting speeds when overheated, although, of course, not to the same extent as ordinary carbon tools.

On the other hand, upon examining the carbon column, we note that the lowest carbon which produced a first-class tool was 0.858 per cent., while the highest carbon was 1.950 per cent. Between these limits, then, our experiments indicated that, as far as the effect of cutting speed was concerned, it was a matter of indifference whether low or high carbon was used. And it is a notable fact that many of the best high speed tools developed up to the present date contain carbon in almost the same percentage as that indicated by the low limit in our experiments.

At the time that we were developing our invention it was not usual to make self-hardening steel containing carbon in as small quantities as 0.86 per cent. An increase of carbon produces an increase in the hardness of a self-hardening tool, although, as indicated by the group of tools from No. 26 to No. 32, increasing carbon beyond 0.86 per cent. does not produce a higher cutting speed or a greater degree of red hardness, which is the distinctive quality of high speed tools. We had the 0.86 per cent. carbon steel made especially for the purpose of testing the effect of low carbon upon red hardness in Taylor-White treated tools. And it was the statement made in our patent, that high heat treated tools containing 0.86 per cent. of carbon gave as high cutting speeds as those containing high percentages of carbon, which first turned the attention of makers of tool steel in this direction.

Our adoption of the higher limits of carbon at the time of the writing of the Taylor-White patent was upon the supposition that through heating the tool many times, in succession to the high heat, the carbon lying in the outer layers of the nose of the tool might be considerably reduced, and that with high carbon this reduction of carbon would leave the tool as efficient as ever, whereas with carbon as low as 0.86 per cent. any material reduction in carbon might affect its cutting speed.

However, more recent experiments have shown that even with comparatively low carbon there is little danger of injuring the tool so that it cannot be repeatedly heated to the high heat from oxidization or burning out of the carbon in the outer layers of the tool; and in the best of the present high speed tools the rather low carbon of 0.68 per cent. is used for the purpose of rendering the steel more readily forged to the proper shape, and also to make it rather less brittle in the body of the tool.

Referring to the manganese column, it is notable that the lowest manganese is 0.07 per cent. and the highest 1.19 per cent. It is clear, then, that low manganese does not affect the property of red hardness in high speed tools. Low manganese renders the tool stronger in its body, less liable to brittleness, less liable to fire crack, and more easily forged and annealed; and for this reason we recommended a steel low in manganese as best for the Taylor-White treated tools.

By examining the three groups of analyses—namely, the effect of high chromium and the effect of low chromium, and the effect of low manganese—it will be noted that making a tool of high chromium with the proper amount of tungsten invariably produces a high speed tool, even although the manganese is low; but that a tool without chromium or with very low chromium, even though there is a proper percentage of tungsten present, does not produce a high speed tool, even though

the manganese may be low or very high. From this it follows that chromium is the element which in combination with tungsten produces the new quality of red hardness and not manganese.

#### **Molybdenum as a Substitute for Tungsten in High Speed Tools.**

Mr. White and the writer stated in our patent that molybdenum can be substituted for tungsten in modern high speed tools, and that one part of molybdenum will produce approximately the same effect as two parts of tungsten. We also stated that molybdenum is not as satisfactory an element as tungsten to use in high speed tools. The writer would repeat these assertions as giving our views at the present day upon the use of molybdenum in high speed steels.

Under the head of "molybdenum substituted for tungsten" to the tools Nos. 55 (at the top of the list) to 63, inclusive (at the bottom of the list), it will be noted that, particularly in the case of tools Nos. 43, 54, 50 and 61, molybdenum tools having high cutting speeds were experimented with during the development of the Taylor-White process, and that from 4 per cent. to  $4\frac{1}{2}$  per cent. of molybdenum appeared to be a sufficient quantity to make a high speed tool; whereas about 8 per cent. of tungsten was required for this purpose. However, by noting our remarks made after most of these tools, it will be seen that they were brittle, had a tendency to fire crack, were weak in the body of the tool or else they were irregular in their cutting speeds. All of these faults are most serious in their nature, and they were at that time and are still regarded by us as so serious that when a tool clearly develops any one of these troubles we at once cease experimenting with it as not worthy of consideration among first-class tools.

The irregularity in molybdenum tools constitutes perhaps its most characteristic feature. By irregularities we mean that tools of the same chemical composition, and apparently treated alike, give large variations in cutting speed. We have as yet been unable to determine with certainty the cause for the irregularity existing in molybdenum tools. One explanation, however, for this trouble may lie in the fact that molybdenum tools appear to run at their highest cutting speeds when given a high heat slightly lower than the high heat required to produce a first-class tungsten-chromium tool. It may be that when the molybdenum tool is heated beyond that precise high heat which is necessary to make a first-class tool it deteriorates.

One of the most useful characteristics in the modern tungsten-chromium high speed tool is that it requires little or no skill on the part of the blacksmith to heat it up close to the melting point, and that the tool itself shows clearly by its appearance when its high heat has been reached. Moreover, it is impossible to injure the cutting properties of these tools even if they are heated to a point at which the thinner or sharper edges begin to melt. The difficulty of judging by the eye an exact high temperature reached by a tool when close to or at its melting point is so great that if a definite treating temperature were required at these very high heats—that is, if tools were injured by heating beyond this temperature—much of the value of the high speed tools would be lost.

Now, as stated, it appears likely that the irregularity in molybdenum tools may be largely due to the fact that a more accurate degree of high heat, considerably below their melting point, is required for them, and that this temperature must be closely judged by the eye of the smith, while no accurate judgment is required for the tungsten-chromium tools, because the tools themselves show when they are close to the melting point; and close to or at the melting point is the temperature which produces a tool giving the highest cutting speeds.

#### **Best Modern High Speed Tools Compared with Original High Speed Tools Developed by Us.**

It will be a matter of interest to compare the various properties and chemical compositions of high speed tools as developed by us at the time that our patent was written with those of the best of the high speed tools that have been made up to the present time. Tools Nos. 26 and 27 are those recommended in our patent. By re-

ferring to their speeds in cutting, on the one hand, a medium steel, and on the other hand, very hard steel and hard cast iron, it will be seen that tool No. 26 gave the higher cutting speeds on hard steel and cast iron, while tool No. 27 gave the higher cutting speeds upon medium and soft steels. Thus, at the time of the writing of our patent, in order that a machine shop should have the best tool equipment it was necessary that tools made of two different chemical compositions be maintained as standards.

Referring now to tool No. 1 in Table I, the best high speed tool experimented with by us in 1906, it will be noted that it has a higher cutting speed upon all the qualities of metal experimented with than any other tool. One of the gains, then, made by the latest high speed tools lies in the fact that in one tool steel are combined all of the most desirable properties, and therefore only one need be adopted in a shop as standard.

We have previously referred to red hardness as the distinctive property of modern high speed tools. Now, while red hardness is the most important property or quality sought for in high speed tools, nevertheless, for certain classes of work—namely, turning the very hard qualities of steel and also hard cast iron—the property of hardness is desirable in addition to that of red hardness. The principal difference between tools Nos. 26 and 27 is that the former combines the quality of red hardness with hardness, while the latter lacks somewhat the quality of hardness, although it possesses red hardness in a higher degree than No. 26. The reason, then, that No. 26 cuts hard steel and hard cast iron at so much higher cutting speed than No. 27 is due to the fact that it adds the quality of hardness to that of red hardness. It must be borne in mind, however, that in the average machine shop more than nine-tenths of the work is done upon the medium or softer qualities of metal. Therefore it is only upon a comparatively small class of work that the quality of great hardness needs to be added to that of red hardness in high speed tools.

One property in which tools Nos. 26 and 27 were both lacking was that, although in cutting soft metals they made the same proportionate gains in cutting speed when taking the fine feeds as when taking the coarser feeds, still when these tools were cutting steel of even medium hardness but slightly higher cutting speed could be used with a feed finer than 1-16 in. than could be taken with a feed of 1-16 in. This presented a really serious defect in our high speed tools, because the greater portion of the feeds taken in the machine shops are finer than 1-16 in.

Tools of the chemical composition of No. 1 were proved in our recent experiments (1906) to be capable of making the same proportionate gain in cutting very hard metals with fine feeds as they made when cutting soft metals with fine feeds. This, then, represents a second feature in which the latest high speed tools are better than those originally developed; and this property is also due to the fact that the latest tool possesses a high degree of hardness in addition to its very extraordinary degree of red hardness. In the quality of hardness, however, it will be noted that tool No. 1 does not outstrip its nearest competitor to the same extent as it does in its extraordinary quality of red hardness, the gain in cutting medium steel being proportionately larger than the gain in cutting hard metals.

The third feature in which tool No. 1 is superior to tools Nos. 26 and 27 is that it is stronger in the body.

By far the most important improvement, however, in No. 1 tool over the original tools, Nos. 26 and 27 (a matter which the writer looks upon as of even greater importance than the 50 per cent. increase in cutting speed), is the fact that it is much more difficult to injure No. 1 tool through carelessness in heating upon the grindstone or through overheating in the lathe under the cut than the original high speed tools. The No. 1 tool will stand a surprising amount of overheating on the grindstone without very serious deterioration; whereas Nos. 26 and 27 were exceedingly sensitive to this bad treatment, and perhaps to this cause more than any other is to be attributed the great lack of uniformity in

high speed tools which existed in the early years of their adoption. For this reason, then, No. 1 tool marks a most important advance in maintaining the all important quality of uniformity.

In our patent and in writing this paper we have referred to the good effects resulting from the second or low heat treatment. The percentage of increase in cutting speed due to the second or low heat treatment was more marked in the case of our original high speed tools Nos. 26 and 27 than it is in the case of our latest high speed tool, No. 1. With the original high speed tools in many cases our low heat or second treatment resulted in a gain in cutting speed of as much as 30 per cent., while in tools of the type of No. 1 the second treatment rarely resulted in a gain of more than 10 per cent., and frequently even not so large a percentage as this.

On the whole, we look upon this as a very great improvement in the latest high speed tools over the original, because even if the new tools are not given the second or low heat treatment at all, still they will be far more nearly uniform than the original tools of this class. Moreover, among those who have stolen and who are using the process of making high speed tools, by heating tools close to their melting point, but very few have used in the past or are now using the second or low heat treatment except in as far as this treatment is given to the tool through heating it incidentally or accidentally upon the grindstone or through heating it under the pressure of the chip in the lathe. The only feature in which tool No. 1 is less desirable than tools Nos. 26 and 27 is that it is more difficult to forge at the old forging heats—namely, about a light cherry red.

We have already pointed out that the substitution of chromium for manganese in both the old self-hardening steels and in the high speed steels allows the tool to be forged at a heat very considerably higher than the light cherry red without danger of crumbling. In other words, the addition of the chromium and the absence of manganese render the tool just the opposite of what is called "red short"—that is, just the opposite of a liability to crumble when struck with a hammer at a high heat.

It will be noted that tool No. 1 contains from 5½ to 6 per cent. of chromium, and this increased percentage of chromium has the very useful effect of allowing the tool to be forged at an exceedingly high heat; in fact, not very far below the melting point. The danger of injuring the tool through oxidization at this extremely high heat is great, however, and we therefore recommend as a forging temperature a light yellow heat. When tools containing from 5½ to 6 per cent. of chromium and of the general chemical composition of No. 1 tool are heated to this light yellow heat they are much easier to forge even than the original high speed tools, Nos. 26 and 27, and also easier to forge than such of the tools as lie between Nos. 2 and 23 and which contain less than 5 per cent. of chromium. This is an added and a great advantage of No. 1 tool over the other modern high speed tools. Tools of the composition of No. 1, then, should be forged at a light yellow heat.

To recapitulate, the improvement in the latest high speed tools over the original high speed tool consists in:

- a. Far greater uniformity, owing to less danger in being injured in grinding and in daily use.
- b. Fifty per cent. increase in cutting speed.
- c. The attainment of almost its maximum cutting speed without the necessity of the second or low heat treatment.
- d. The combination in the same tool of the highest degree of red hardness with a high degree of hardness, thus requiring only one standard high speed tool steel in the shop.
- e. The ability, owing to increased hardness, coupled with the necessary red hardness, to make the same proportionate gain when cutting with fine feeds upon hard metals as upon soft.
- f. Greater strength in the body.

The only point of inferiority is increased difficulty in forging at a cherry red, and if blacksmiths are taught to forge their tools at a light yellow heat these tools are easier to forge than the original high speed tools.

We have referred to the fact that since writing our patent no improvement whatever has been made in the heat treatment of high speed lathe and planer tools. The all round gain in the No. 1 tool over the original high speed tool, then, lies entirely in a change in chemical

composition. It would seem, therefore, a matter of interest to point out the change in the composition of these tools, and, so far as practicable, to indicate the cause and effect of the change in each of the improved elements.

**Principal Chemical Changes Made in Best Modern High Speed Tool Over Original High Speed Tool Developed by Messrs. Taylor and White.**

Our patent describing the original high speed tool claims, briefly speaking, the combination of one-half of 1 per cent. of chromium, or more, with 1 per cent. of tungsten, or more; the tool to be treated to the high heat, &c. In our patent we also state that, practically speaking, the best tools developed by us at that time contained 2 to 3.80 per cent. of chromium instead of 0.5 per cent. of chromium, and 8 to 8.50 per cent. of tungsten instead of 1 per cent. of tungsten.

The principal chemical change which has taken place in the best high speed tools up to the present time has been to increase still further the percentage of chromium, so that instead of containing 3.80 per cent. as recommended by us, the tools now contain from 5.50 to 6 per cent., and to still further increase the tungsten from 8.50 per cent. to from 18 to 19 per cent. This large increase in the percentage of chromium and tungsten has produced the material increase of 50 per cent. in the red hardness of the tool and at the same time, also, a material increase in the hardness over our original high speed tool No. 27. It is notable, however, that if the percentage of tungsten is increased much beyond 19 per cent., even although the chromium is also increased in quantity, that the tool diminishes in red hardness. This fact will be noted by comparing the cutting speeds of No. 14 tool (which contains 24.64 per cent. of tungsten and 7.02 per cent. of chromium) with the cutting speed and chemical composition of No. 1 tool; and the metal close to the cutting edges of tools containing these very large percentages of tungsten and chromium appear to yield or become slightly deformed, particularly when cutting the thinner shavings or chips.

The presence of high manganese in a tool and also the presence of high carbon, both tend to increase the hardness of the tool. They make the tool more brittle in the body, and in addition high manganese causes the tool to crumble in forging when heated much beyond a bright cherry red. It was for this reason that we, in our original Taylor-White tools, specified low manganese (0.15 per cent.), and this has been adopted as a characteristic in all the modern high speed tools.

The tools as recommended in our patent contained carbon to the extent of 1.85 per cent., and this element has been lowered in modern high speed tools largely as a result of the fact pointed out by us in our patent, that the quality of red hardness is not materially affected by either high carbon or carbon as low as 0.86 per cent. If either high manganese or high carbon (as much as 1.85 per cent.) were used in a tool in combination with 5½ per cent. of chromium and 19 per cent. of tungsten, the tool would be brittle in the body and exceedingly difficult to forge, and the presence of high manganese particularly would tend to reduce rather than to increase its red hardness. Therefore the latest high speed tools contain manganese in as small quantities as is practicable when the expense of the mixture and the needs in melting are considered.

Modern high speed tools have been recently experimented with by us containing carbon varying from the small amount of 0.32 per cent. to the higher percentage of 1.28, and our conclusion from these experiments is that the property of "red hardness" in the modern high speed tools is not noticeably affected by either high or low carbon within these limits. The quality of hardness, however, in the tool is affected by the percentage of carbon and, as previously explained, a certain degree of hardness is required as a property in high speed tools for several reasons.

The carbon contents of the modern high speed tools, then, would seem to be governed by a compromise between the two requirements: On the one hand, higher carbon is needed to produce a greater degree of hard-

ness in the tool, and, on the other hand, lower carbon is needed to make the tool more readily forged and also to make it stronger and tougher in the body.

As indicated in Table I, the analysis of tool No. 1, the best tool experimented with by us, contained 0.68 per cent. carbon, and we recommend for a modern high speed tool not less than one-half of 1 per cent. (0.5 per cent.).

There is one element of less importance than those previously considered which nevertheless should receive attention. The statement has been published several times that high silicon tended toward higher cutting speeds in high speed tools. In developing our patent we experimented quite thoroughly with this element and arrived at the conclusion that high silicon tended toward slower cutting speeds, particularly when cutting the harder metals. In our patent, therefore, we recommended the low silicon, 0.15 per cent., and it will be noted that, on the whole, low silicon is a characteristic of most modern high speed tools.

Our experiments indicate that high phosphorus and sulphur are much less injurious to high speed tools than they were to the carbon tools. However, these elements still exert a somewhat injurious influence upon the steel, and we therefore recommend, inasmuch as the presence of chromium and tungsten in large quantities necessarily render high speed tools very expensive, that the best qualities of low phosphorus and low sulphur iron should be used in their manufacture.

**Discovery by Taylor and White That Small Quantities of Vanadium Improve High Speed Tools.**

No manufacturer of tool steel needs to be informed that the chemical analysis of steel (at least those analyses which are ordinarily made in our best chemical laboratories) is not alone a true or infallible guide to the real quality of steel. There are other factors than the elements which are ordinarily determined in laboratories which affect the quality of the tool steel.

We all know that to obtain the best quality of tool steel the mixture must be melted just right. The melting must be thorough and complete in order to bring about the proper alloying of the tungsten and chromium with the iron and carbon without at the same time oxidizing the bath. In addition to this, the metal must be poured or "teemed" in the right way in the molds, and the ingots must be made of the best size and shape for the subsequent operation of hammering the steel. The steel itself must be also carefully heated and handled during the operation of hammering. All of these elements affect the quality of the steel as well as the chemical composition.

Perhaps the most important of these collateral elements or influences affecting the quality of tool steel, however, is that of the melting and pouring or teeming of the ingot in such a way as to remove as far as possible those chemical impurities which are not indicated by the ordinary chemical analyses; and of these impurities we believe that the more obscure oxides constitute the worst enemies of steel. The term "good melting" might be translated into more scientific language by saying that the steel should be so carefully mixed and melted as to contain the minimum quantity of these injurious oxides. There have been various expedients adopted by makers of tool steel to secure this end, and some of these are still held more or less as trade secrets. It is our belief, however, that we have discovered during the last year perhaps the most efficacious remedy for "bad melting" that has yet been devised. We refer to the use of vanadium, a metal comparatively new in the art of practical steel manufacture. James M. Gledhill, in his paper on "The Development and Use of High Speed Tool Steels," published in the *Journal of the Iron and Steel Institute*, in 1904 speaks of having substituted vanadium for chromium in high speed tools, and he states that while the vanadium when used in cutting a steel of medium hardness stood well, yet it did not do better than tools containing the element of chromium.

Our experiments indicate the fact that vanadium should not be substituted for chromium, but that a very minute quantity of vanadium should be added to the mixture in melting, and that its use to the extent of from

0.15 to 0.35 per cent. is as effective as higher quantities in the mixture. Our experiments would indicate the probability that the good effects of vanadium are derived from its chemical property as a cleanser of the steel during the operation of melting rather than as a very valuable property in the steel after it is melted. From 0.15 to 0.30 per cent. of vanadium when mixed with the steel in the pot sometimes disappears entirely from the finished steel, and its presence cannot be found by analysis, indicating that it has probably joined with some other element, or elements, and gone off into the slag. It is likely, then, that minute quantities of vanadium act as cleansers of the bath, uniting with some of the obscure oxides and carrying them off into the slag. We know, for example, that the shop in which No. 1 tool was made is not run with the exceptional skill of long experience, and yet in this shop the addition of small quantities of vanadium very materially improves the cutting properties of the tool.

An illustration of this fact will be seen by comparing steel No. 18 with steel No. 19, these two steels being practically the same chemical composition except that one of them has had a small amount of vanadium added to it. These samples of steel were made in the melting shop above referred to.

To close the subject of the chemical composition for high speed tools, we do not wish to give the impression that we believe that No. 1 tool represents the chemical composition of the best tool which will ever be made. On the contrary, we believe that the improvement in the proper combination of the various elements required to make a high speed tool will continue.

### The Swedish Policy Regarding Iron Ore Exports.

The German iron trade is considerably agitated over the attitude of the Swedish Government toward the export of iron ore. The original proposal to place an export duty on iron ore failed to receive the support of the legislative body by a narrow margin. The German Government subsequently entered upon a commercial treaty with Sweden which, as the Germans assumed, protected them against an export duty. Now the news has come out that the Grangesberg Oxelosund is allowed to transport only 1,200,000 tons annually over the road from Kirunavata to the port of Narvik, although the hauling capacity of the road is considerably larger and the mines can produce two or three times that quantity. The company had made application for an additional 400,000 tons for 1906 and received authority to ship only 300,000 tons additional, while a request for 600,000 tons additional for 1907 was rejected altogether. The rates have also been advanced. It looks as though the Swedish Government were trying to embarrass the export of iron ore by indirection, and in spite of treaties, after failing to check shipments directly.

### The New England Foundrymen's Association.

The monthly meeting of this society was held at the Exchange Club, Boston, December 12. President W. B. Snow presiding. Application for membership was received from the Vanderman Plumbing & Heating Company, Willimantic, Conn., which was admitted to membership. Announcement was made that the annual meeting of the association would be held January 9. It is intended to have many special features for entertainment. Messrs. Fernald, White, Arnold, Lovejoy and Breen were appointed a Committee of Arrangements. An interesting paper on "Evils and Restrictions of Carelessness," by Thomas D. West, Sharpville, Pa., was read. After dinner Herbert E. Field, Pittsburgh, Pa., read a paper on "Technical Foundry Education." A discussion followed.

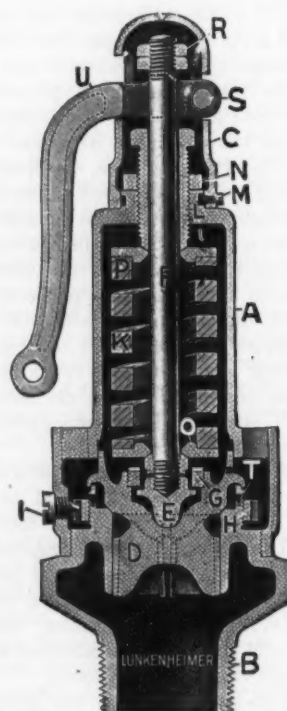
The imports of merchandise into the United States in the month of November reached a greater total than in any previous month in the history of the country. The value of such imports is placed at \$119,689,830. The ex-

ports also ran up to very high figures, amounting to \$182,509,398, thus showing an excess over imports of \$62,819,568. The excess of exports of merchandise over imports for the 11 months of 1906 is \$421,657,430, against \$349,250,524 for the corresponding period of 1905.

### The Lunkenheimer Improved Pop Safety Valve.

The redesigned pop safety valve as now manufactured by the Lunkenheimer Company, Cincinnati, Ohio, is very simple in construction and is claimed to fulfil the most rigid requirements with respect to reliability, accuracy and positiveness of operation. It is made heavy and of high grade bronze composition, and has a large spring insuring durability. It has a full relieving capacity, is very sensitive to any excess of pressure, and is capable of being finely adjusted.

A lock key, which attachment is provided with the valve, guards against its being tampered with, and the adjustments of the pop lip and pressure can be made from the outside of the valve without taking it apart. The spring



The Lunkenheimer Improved Pop Safety Valve.

is held between ball and socket plates, which distribute the pressure uniformly on the disk, and being encased the valve cannot be affected by back pressure. The valve disk and its seat are ground at an angle of 45 degrees to the vertical axis of the valve. By means of the lever the disk can be raised from its seat to open the valve at will. The use of this valve is allowed at the highest inspector's rating, 1 sq. in. of valve area to every 3 sq. ft. of grate surface of boilers.

The pop or action of the steam in escaping is regulated by the ring H in the base of the valve, which is easily accessible without taking the valve apart, and is held securely in place when set by the regulating ring screw I on the side of the body. If the valve pops suddenly and does not relieve the pressure enough, the ring H is turned up to more or less cover the openings T and so cause the disk to remain longer off its seat. If the valve pops too much, opening and closing gradually, then the ring H is turned down. When the desired adjustment is obtained the ring is locked by the set screw I.

To take the valve apart, the lever U is removed, then the bonnet C, after which the load on the spring is relieved by unscrewing the regulating screw L. The regulating ring screw I is then removed and the bell A unscrewed. To set the valve to operate at a high pressure it is only necessary to turn the regulating screw L down, and for a lower pressure to turn it up.

## The Naval Ordnance Bureau's Report.

WASHINGTON, D. C., December 18, 1906.—The fear that, owing to the lack of armor orders, one or two of the three armor manufacturing concerns in the country may be obliged to make over their plants for other purposes is expressed in the forthcoming annual report of Admiral N. E. Mason, chief of the Bureau of Naval Ordnance. The report says in part:

### No Armor Contracts in Sight.

During the fiscal year ending June 30, 1906, the total amount of armor delivered under previous contracts was 17,310 tons, which included the last of that due under contracts dated in November, 1900, and February, 1903. There remained on June 30, 1906, to be delivered under contracts dated December, 1903; January, 1904, and April, 1905, a total of 6420 tons.

It is believed that before the end of the calendar year the Bethlehem Steel Company and the Carnegie Steel Company will have completed and delivered all the armor assigned to them under outstanding contracts. There being now in existence in this country three fully equipped armor plants capable of supplying collectively an approximate amount of 30,000 tons a year, the bureau would feel that there exists no cause for anxiety as to meeting any possible future requirements of shipbuilders were it not for the fact, much to be regretted, that there now exists little demand for armor. This condition of affairs is embarrassing, for the reason that it creates the possibility of one or more of these firms abandoning the armor making industry in order to utilize the plant for more productive commercial manufactures, and thus leave the Department dependent on the capacity of possibly one plant to meet all future demands. Such a backward step in the armor resources of the country would be most regrettable and unsafe.

The high standard of quality of armor required by the bureau is still met by the armor makers in a most satisfactory manner. The greatly increased severity of the ballistic test required by the specifications of the contracts of April, 1905, in which only capped projectiles are used, has been successfully met by the Bethlehem and Carnegie steel companies with all the armor allotted them under those contracts, all of which has been tested. The Midvale Steel Company has not yet submitted any armor for test under those specifications.

### To Investigate New Steels.

The remarkable developments of the last few years in the manufacture of steel have involved so many points of possibly vital interest to this bureau in connection with material for guns, armor and projectiles, that it has been found desirable to organize a Board of Officers for following these developments, with a view to benefiting by them wherever they present an opportunity for improvement.

It has been hoped that among the many new alloys which have proved of value in connection with commercial steels there might be discovered some material for the tubes of high powered guns, or for liners inside these tubes, which would give less erosion than exists with plain carbon and nickel steels. The board above referred to has this subject under consideration and investigation. As regards the strength of material the new alloys give promise of remarkable results, and two experimental guns now under construction are confidently expected to show a strength much beyond that of any guns heretofore constructed.

The board on forgings is making a study also of "streaks," "sand splits" and other defects which from time to time appear in gun forgings, in the hope of determining definitely the cause of these defects and the degree of importance which should be attached to them. Up to the present time no satisfactory explanation of the cause of these phenomena has been offered by any manufacturer of steel.

### Floating Machine Shops and Ammunition Ships.

The bureau calls the Department's attention to the desirability of equipping an auxiliary vessel for use as a

machine shop and store vessel with the fleet. On such a vessel numerous minor repairs and modifications in ordnance, as well as in other departments, beyond the capacity of the machine shops of the vessels themselves could be made at once, instead of having either to send the vessel to a repair yard, or wait until a favorable opportunity for the absence of the vessel from the fleet. In addition, this auxiliary vessel could well carry a full supply of stores and spare parts of all kinds and descriptions, thereby allowing a material reduction in the amount of stores, spart parts and material ordinarily carried on board each ship, and increasing space and decreasing weights, which could well be used in increasing the coal or ammunition supply. Such an auxiliary vessel was found to be of great utility during the Spanish-American War.

### Ammunition Ships Needed.

In the design of vessels of the battle fleet the space and weight assigned to ammunition has been so restricted that the ammunition on board, under certain conditions of battle, would be expended in something less than an hour. It is considered of the utmost importance that in the organization of the fleet there should be two vessels of considerable size, one on the Atlantic and one on the Pacific Coast, devoted exclusively to the transportation of ammunition. Ultimately there should be one of these vessels with each fleet. Such ships should be fitted with appliances for assembling and breaking down ammunition, in order that they might serve to as great a degree as possible as floating naval magazines.

### Patents by Naval Officers.

The bureau invites the attention of the Department to the lack of a definite provision of law regarding the securing of patent rights by the Government of inventions of officers. The bureau believes that the intent of the present law is that the inventions of naval officers of war appliances, made in the course of their work and duty under the Government, should be the property of the Government. In practice the result intended is rarely obtained, and even where the officer making the invention is perfectly willing to forego all financial benefit the method by which the Government may secure the patent rights is one that entails risk of the loss of attorney's and Patent Office fees to the officer, and in any case results in temporary financial loss, since the officer concerned must now obtain the patent rights in his own name and then assign them to the Government in consideration of the attorney's and Patent Office fees, and should there be a failure to secure a patent the costs must fall upon the officer. The bureau recommends that legislation be asked that will permit of a Department of the Government applying for patent rights in its own name on inventions of its subordinates and paying the costs of such application.

Another phase of the question, which seems to the bureau to require consideration and remedial legislation is that of compensation for an officer making an invention. At present no compensation can be given directly, and the result is that officers that do receive a benefit from their inventions by indirect means are placed in positions disadvantageous to themselves and to the service.

### Naval Gun Factory.

During the last year the output of guns, mounts and accessories at the naval gun factory at the Washington Navy Yard has increased very much and is the greatest output for one year in the history of the factory. Many administrative improvements have been made during the year and considerable new machinery has been installed.

The superintendent of the naval gun factory recommends some important improvements which are strongly indorsed by the bureau. The principal items are as follows: New and improved machinery, \$150,000; new foundry, \$300,170; machinery, cupolas, furnaces, &c., for foundry, \$121,071; remodeling 110-ton crane in north gun shop, \$30,000; locomotive and crane house, \$61,747; machinery for the same, \$12,000; renewing floor of coal bin, \$60,000; quay wall, \$90,517; fireproof general storehouse,

\$290,000; iron bridge, \$40,000; land for the extension of yard, \$161,872.

#### Cost of Holidays.

As having an important bearing upon the relative cost of Government work and that done by private manufacturers, the bureau submits a statement of the disbursements made last year for wages on account of holidays, leave of absence, &c., which shows that the sum of \$234,000 was nonproductive last year, while for the current fiscal year the amount will be approximately \$300,000. The half holidays granted to employees of the gun factory on Saturdays during July, August and September cost the Government \$62,358 per annum. A holiday with pay at the factory costs nearly \$11,000. W. L. C.

#### Central American Notes.

SAN JOSÉ, C. A., November 30, 1906.—Mr. Root's visit to Latin America has been prolific in more ways than one. Renewed interest is shown in bettering the means of facilitating trade between the American republics. It will be remembered that the Pan-American conference at Rio de Janeiro recommended the "stimulating of a rapid service of communications by railroad, steamer and telegraph lines, as also postal conventions for the carriage of samples, so that goods and commercial advertisements may circulate with rapidity and economy." Brazil has been the first to establish a line of steamers to the United States. The same nation has made preferential rates and concessions on certain kinds of American goods coming into the country.

German, British and French merchants are still ahead of us in the matter of credits. Americans usually demand spot cash instead of six, nine or twelve months' credit given by the other nations. Thus our manufacturers lose a great deal of business in many lines. It is true that more than four-fifths of all the electrical machinery used in Brazil, Uruguay and Argentina comes from the United States. With good salesmen who know the Spanish or Portuguese language no doubt other lines will quickly show increases, but larger credits are very essential, if we mean to hold our own against Europe in Spanish America.

Heavy consignments of American agricultural implements have lately been received in Buenos Aires, Rosario and Montevideo. Our manufactures are lighter, stronger and generally better made, according to the opinion of the farmers and *estancieros* of Rio de la Plata. A great deal of our mining machinery for the Andean mines goes through the ports of Rosario and Buenos Aires and then by rail across the Pampas.

It was supposed that the heavy loss in Chile, due to the recent severe earthquake, would give a setback to the Transandine Railroad from Buenos Aires to the Pacific Ocean, but the Government has lately pushed the work in the mountains, which is the most difficult part, by the way, and several cargoes of railroad material have arrived. Valparaiso and the surrounding towns are building up rapidly, many of the houses being of steel frame. Much corrugated iron is also used. The Government buildings, custom houses and similar constructions will be mostly of steel. Bids will soon be opened for the new piers and docks in the Bay of Valparaiso, and the damaged railroad lines to the interior have nearly all been repaired. C.

*Lloyd's Register*, in reporting upon the amount of mercantile shipping under construction in Great Britain and Ireland at the close of September, comments upon a decided falling off during the quarter then ended, the decrease having been greater than in any previous quarter for more than 22 years. The present loss is 144,000 tons, as compared with a loss of about 170,000 tons in the spring and summer of 1884. The tonnage under construction in the current quarter was 1,264,767 tons gross, of which less than 1 per cent. represents sail tonnage. Of the 478 steam vessels included in the report, nine are of over 10,000 tons each, including three of upward of 24,000 tons. Twenty-five others are of over 6000 tons each.

## The Manufacture of Brass Wire.\*

BY E. J. BOLTON.

The quality of brass depends upon the proportions of the two constituents—i. e., the greater the quantity of zinc the lighter the color and the more brittle and springy the alloy, while, on the other hand, the greater the quantity of copper the redder the color and the tougher, but softer, the alloy. The following are the usual proportions in the common sorts of brass:

Red brass.....	= 4 parts copper to 1 part zinc.
Yellow brass.....	= 2 parts copper to 1 part zinc.
Muntz metal.....	= 3 parts copper to 2 parts zinc.
Brass or spelter solder.....	= 1 part copper to 1 part zinc.

For brass wire the mixture most probably used is 5 parts copper to 3 parts zinc, but the proportions vary greatly, according to the purpose for which the wire is to be used. For some purposes, such as the manufacture of pins, where rigidity is of more importance than toughness and cheapness is essential, it is possible to use Muntz metal, while for drawing into very fine gauges and weaving into the gauze that is used largely in paper making machinery much richer grades are employed. As zinc is a much cheaper metal than copper the more zinc used the cheaper the brass.

The three important operations in the manufacture of brass wire from copper ingots and spelter are casting, rolling (and in some cases slitting) and drawing.

#### Casting.

The alloying of the copper and spelter is performed in crucibles. These are generally made of plumbago and are about 16 in. in depth and 10 in. in diameter at the top, tapering to about 9 in. in diameter at the bottom, the thickness of the walls being about 1 in. These crucibles are heated in furnaces, the common type being the "wind furnace." This is fired with solid fuel and has a natural draft, the height of the chimney stacks varying from 40 ft., where each furnace has its separate stack, to 150 ft., where a number of furnaces are connected to one stack. It is usual to heat a number of crucibles at once, each in a separate grate connected to a main flue, which leads the products of combustion to the stack. Gas furnaces are also used in combination with generators, in which case producer gas, or sometimes water gas, is burned in place of the solid fuel; in these it is usual to heat 10 or 12 crucibles in one furnace or chamber. Reverberatory and tilting furnaces are employed for large castings in sand molds, but for casting ingots in metal molds it is usual to employ a crucible furnace of the "wind furnace" type, the fuel commonly used being coke. Tilting furnaces are especially used in America.

#### Rolling.

Most of the grades of brass can only be rolled cold, and in consequence the same methods are not available as in the manufacture of copper and steel wire. Muntz metal is the only mixture than can readily be rolled hot satisfactorily, and it is possible to roll wire rods of small diameters of this metal, as is done with copper. The process is difficult, owing to the narrow range of temperature at which the metal is workable. It is, the author has been informed, done to some extent in America.

The oldest method of making brass and the one still very largely used is as follows: The metal is cast into long, narrow ingots of about 1 cwt. each, or a little more, and from 3 to 4 in. wide. The molds are generally made of cast iron, cast in halves, which are clamped together with wrought iron rings. The molds are placed below the surface of the floor of the casting shop, and are supported against the side of the pit at an angle of about 60 degrees. Boards are placed across for the caster to stand upon while pouring the metal from the crucible into the mold. The metal, after careful skimming, is poured into the mold at the top, and when it has set the rings are slipped off the mold and the upper half removed, leaving the casting or ingot exposed. Before the metal is poured into the mold the inside of the mold is well brushed and dressed with resin and cottonseed oil to prevent adhesion, or carbon in a fine state and whale oil are also used,

\* From a paper read before the Graduates' Section of the Institution of Mechanical Engineers (Great Britain).

which give the mold an even surface. The ingots are next rolled when cold between ordinary flat rolls until the desired thickness is obtained, depending upon the final gauge of the required wire.

#### Slitting.

The resulting strips are then slit with gang slitters into a number of shreds, each shred or "slitting" being afterward drawn into a separate wire; the outer ones, however, are usually scrapped. Gang slitters consist of two revolving shafts placed parallel above one another and revolving in opposite directions. On each shaft is mounted and keyed a row of circular steel plates of a thickness equal to the width of the intended slittings, and kept equal distances apart by collars of the same thickness. The edges of the cutting rings are turned absolutely square and the sides true. The rings on one shaft fit into the grooves on the other, and slit the strip in much the same way as scissors cut cloth. The strip when once started works its way through the cutters, owing to the opposite direction of revolution of the two cutters.

The advantage of this system is that it is cheap and the strip can be made suitable for any required size of wire without much subsequent drawing. The disadvantage is that if the strips are slit into narrow shreds in order to save drawing, owing to the ingot being limited in weight by considerations of convenience in handling, only light pieces of wire are obtained, the weight of the piece depending upon the width of the slitting. These light pieces are not liked by the consumers, and also entail much labor in drawing. If the slittings are heavy they are large in section, and therefore require a great deal of drawing. This may, however be got over to a certain extent by rolling the strip comparatively thin and subsequently rolling the slitting again in an edgewise position into an approximately circular section, much less in diameter than its original width. Probably the best process, and the one employed almost universally in America, at any rate for grades of brass which can only be rolled cold, consists of casting the brass in the form of long bars, either square or round, from  $1\frac{1}{4}$  to  $1\frac{1}{2}$  in. thick. Each of these bars is rolled down separately in the cold state into a rod about  $\frac{3}{8}$  in. in diameter, or sometimes less, which is afterward drawn into wire. Pieces weighing from 60 to 70 lb. can thus be obtained. The advantage of this process over the old one is that longer lengths are obtained and labor in the drawing is to some extent saved.

A process brought out some years ago in the North of England consisted in casting in a centrifugal mold about 18 in. in diameter, and mounted on a vertical axis revolving at a high speed, so as to produce a casting in the form of a hoop. This was rolled down in open ended rolls, brought together with hydraulic pressure, and working in the same manner as those used for rolling out the tires for locomotives and other railroad rolling stock. A large, thin hoop about 3 in. wide resulted, which was then cut in circular shears helically, forming a long strip, and this was drawn in the usual way. The great advantage of this method lay in the fact that a heavy piece was obtained, at the same time having a small section ready for drawing. This process appeared full of promise at the time, but has not been heard of since, very probably owing to the fact that the critical temperature in the cooling was reached while the metal was in motion, thus spoiling the homogeneity of the alloy and possibly causing distortion of the molecular structure, the quality and strength of the metal being therefore reduced. In France a method often employed of making the "slittings" is to roll the metal down into large sheets, which are cut into strips spirally. This method is all right, but, so far as the author is aware, it has not been adopted in England. Another method tried in America consists in casting a solid billet, which is pierced with a suitably constructed mandril to form a cylinder. The cylinder is afterward cut up helically and drawn in the usual way. This, the author has heard, was not found economical.

#### Drawing.—A Continuous Process.

By whatever method the rod or slit strip may be produced it has next to be drawn into wire of the size

required. The process employed consists of pulling it through tapered dies and so reducing the sectional area and increasing the length. To start the strip through the die it is necessary to point the end with shears and start it by means of a pull obtained by a pair of pincers, which are generally hooked to an endless chain moving along the bench. When a sufficient length has been pulled through the die to reach the wire block the end is attached by a small vise to the latter, which consists ordinarily of a slightly conical drum mounted on a vertical spindle and flanged at the lower end. The wire is wound on this in a continuous coil, constantly slipping up the slightly inclined surface. The power being applied to this drum the force required to draw the wire through the die must be transmitted entirely by the wire itself, and consequently the limit to reduction at one draft is reached when the force required to pull the wire through the die is nearly equal to the maximum tensile stress that the resulting wire can stand without rupture.

In recent years continuous drawing machines have come very much into use. With these machines, instead of winding the wire on a block, after drawing through one die at a time, the wire is drawn through one die, then wound two or three times around a block and taken through another die, and so on, the friction on each drum being sufficient to carry the wire forward and the circumferential speed of the drums being varied to suit the elongation of the wire. Owing, however, to brass being very quickly hardened by drawing it is not possible to carry on this process *ad infinitum*, unless the wire be annealed periodically. When once it has been annealed it is possible to effect a very large reduction at one draft, the actual amount varying with the composition of the brass, the larger the proportion of copper the greater the reduction at one draft. It is obvious, therefore, that the labor saved on continuous machines is much less in the case of brass than it is in the case of a metal like copper, which can be drawn through many dies in succession without annealing. The author has seen fine copper wire passing through as many as 20 diamond dies on one machine. In any case, however, continuous machines are of little use, unless the pieces of wire are fairly heavy.

#### Dies.

In England steel dies are chiefly used, which are set to size by the wire drawer with a punch of the correct diameter and shape. In America chilled cast iron is used, and these dies are reamed out to size by a special man, who spends all his time looking after them, the wire drawer merely attending to the machine. In both countries for fine wire diamond dies are utilized. These dies are formed with a rough diamond set in a suitable metal holder, through which a hole of the required diameter is drilled and through which the wire passes from one block to another. Diamond dies are practically always employed in connection with continuous machines up to gauges where the size would be so large as to make the price prohibitive. The reason for using diamonds is, of course, that they are harder than steel; they therefore last longer than the steel or chilled cast iron dies, and very seldom require adjusting to size. The foreman of the die department of a Birmingham firm recently showed the author a diamond die which he said had been in constant use for the last seven years, whereas steel dies require resetting constantly. The manufacture of these dies forms in these days an industry in itself, but one or two of the most important British firms manufacture their own dies. The holes in the diamonds are drilled by means of hard steel drills pressed lightly against the stone, while the latter is revolved at a very high speed and fed with oil and diamond dust. Wire as fine as 0.001 in. is obtained in this way, which is considerably finer than a human hair, the usual diameter of which varies from 0.0025 to 0.003 in. It can readily be imagined that the drilling of holes 0.001 in. in diameter through a diamond is a very delicate process requiring much care and skill. The author believes the manufacture of diamond dies originated in Switzerland.

The Prussian State Railroad Administration is about to place very large orders for rolling stock. The shortage of equipment this year has been severely felt.

### Barriett Multipolar Motors and Generators.

The most recent design in direct current motors and generators, and one embodying a number of improvements, is that shown in the illustration, known as the multipolar type E and manufactured by the Barriett Electric Company, Cincinnati, Ohio. While making it all that it should be from an electrical standpoint, special attention has also been given its mechanical design to make it simple and strong. The motors are built in sizes ranging from 5 hp. up, the speeds having been chosen to suit a large variety of work, as will be appreciated when it is stated that they are being used for running elevators, machine shops, printing presses, wood-working machines, machine tools, mining hoists, shoe factories, &c. The generators are made in frame sizes corresponding to the motors.

The motor belongs to the universal self-contained class, and may be suspended from the ceiling or wall

Barriett motor, which has been built for several years. The company also builds small motors from  $\frac{1}{2}$  hp. up to 4 hp. of the same general design as the above, except that they are of the bipolar type, as is usual on small machines. This line of machines is intended to cover nearly all the sizes where individual motor drive is used.

The description of the construction of the motors applies also to the generators.

**Electric Locomotive Data.**—Data obtained on the use of electric locomotives for hauling freight trains have been analyzed in Germany. The locomotives are each equipped with two motors of 30 kw. each and operate on a track with a gauge of 1 meter. The freight cars each weigh 2.2 tons empty and are designed to carry a load of 4.8 tons. The train consists of a locomotive and three cars, making a load of 14.4 tons of freight, and a total behind the draw bar of 21 tons. The weight of the empty train (dead load) is thus 46 per cent. of the freight load



The Multipolar Type E Motor Built by the Barriett Electric Company, Cincinnati, Ohio.

or bolted to the floor. The armature is of special interest, as the type of winding employed enables the overall length of the machine to be made less than in other designs, which is a considerable advantage where space is limited. Being form wound, the armature coils are interchangeable. The winding employed, known as "two-circuit," allows the armature to run satisfactorily even after the bearings are considerably worn. A special bronze, which after a number of trials was found to give much better results than phosphor bronze, is used in the bearings. It wears well and has a low coefficient of friction. The bearings are automatically lubricated by rings running in an oil well. The brush holders on these machines are of the Barriett design and give a radial feed to the carbons, which acts automatically as the brushes wear.

It will be noticed that the main leads are brought through fiber tubes in the frame in conformity with the requirements of the National Board of Fire Underwriters. The machines are made protected, semi or fully inclosed, as desired, and will supersede the open type C

and 32 per cent. of the total load. In ordinary practice these figures are said to be, respectively, 63 and 38 per cent. The road in question runs from Heidelberg to Wiesloch, 8 miles, the distance being covered in one hour. A freight contract for the transportation of limestone to cement factories 3 miles from the quarries is at the rate of 14 cents per ton, or 42-3 cents per ton-mile. On the up grade the power required is 0.88 kw.-hr. per train mile, with a reduction for the down grade of 10 to 15 per cent. In 1904 the road operated a total of 36,000 train miles.

The Baltimore & Ohio Railroad has issued from the office of W. W. Wood, industrial agent, Baltimore, a pamphlet of 159 pages, 4 x 8 in., which constitutes its "Industrial Guide" for 1906. Information is given, in an alphabetical arrangement of States and cities and towns, concerning the industrial status and advantages of all points on the Baltimore & Ohio Railroad. The number and classes of industries are indicated, as well as the raw material supplies available.

### Shipbuilding in Government Yards.

WASHINGTON, D. C., December 18, 1906.—Admiral W. L. Capps, chief of the Bureau of Construction and Repair, in his annual report to the Secretary of the Navy, makes some interesting comments upon the results of the contest between the New York Navy Yard and the Newport News Shipbuilding & Dry Dock Company in the building of the battleships Connecticut and Louisiana, maintaining that the Connecticut was as speedily built as her sister ship, but conceding frankly that the Government cannot compete with private shipyards in the matter of economical construction. In this connection he says:

"The actual condition of work on the Connecticut and Louisiana at the time of the delivery of the last named vessel was practically identical so far as concerns all matters unconnected with armor and armament, so that the rapidity of construction of the navy yard built vessel may be regarded as fully equal to that of the contract built vessel. The building of the Connecticut at the navy yard, New York, practically within the contract period of completion, is a most creditable achievement when it is realized that up to that time no single battleship or other large vessel for the navy had been completed within the time provided in the contract for such completion. The building of this vessel has also given the Department very valuable information as to the actual cost of certain classes of work; has trained a very skillful body of men whose services can now be utilized in connection with the fleet collier authorized to be built at the navy yard, New York, and who are, moreover, available at any time for urgent repair work to the fleet.

"As a matter of fact, throughout the construction of the Connecticut the services of mechanics ordinarily employed on that vessel were utilized in making repairs to the fleet, so that, had the only question involved been the speedy construction of the vessel, it is more than probable that the time of construction could have been very materially reduced by taking on new men for repair work and making the employment of mechanics on the Connecticut continuous. Such a method, however, would have been uneconomical, and would have defeated one of the most useful purposes to be accomplished by reason of the performance of a moderate amount of new construction in navy yards.

"The bureau sees no reason to change its opinion, previously expressed, with respect to the relative cost of building new vessels by contract or in navy yards, the record of many years past indicating clearly that the cost of contract built vessels should be less than that of similar vessels built in Government navy yards, by reason of the shorter hours of labor, paid holidays, leave, &c., granted to navy yard employees. As stated in previous communications, however, it is believed that at least one yard on the Atlantic Coast and one yard on the Pacific Coast should, when practicable, be given a reasonable proportion of new construction work, in order that such yards, one of which on each coast is now suitably equipped, may always be available for any work the Government may desire to undertake therein.

"Since certain work necessary to the completion of both vessels will have to be done during the fiscal year 1906-1907, it is not practicable at this time to give the exact total cost of the Connecticut and Louisiana, but it may be stated with assurance that the total cost of the hull and machinery of each vessel will be within the limit as now authorized by Congress."

#### Value of Model Basin.

An important chapter of Admiral Capps' report is devoted to a description of the work done for private shipbuilders as well as for the Government in making tests of ship models in the recently constructed basin at the Washington Navy Yard. He says:

"One of the greatest aids to the bureau in the development of new designs is the experimental model basin, which has been in continuous operation throughout the year. Private concerns continue to avail themselves more and more of the facilities of the model basin, and work done for such concerns at their expense, as pro-

vided by law, was nearly one-sixth of the work of the model testing during the year.

"The finally accepted model of the South Carolina and Michigan will result in a gain of speed for those vessels, under trial conditions, due to improved underwater form, of about  $\frac{1}{2}$  knot, as compared with preceding vessels of the same size, whose lines were developed in the earlier stages of work at the model basin, and were themselves much superior to the lines of still earlier battleships which were designed before experimental work in the model basin was practicable. For our earlier battleships for which speed premiums were provided, the rate of premium was \$25,000 for each increase of  $\frac{1}{4}$  knot. If this were applied to the South Carolina and Michigan it would amount to about \$100,000 for the two vessels.

"From careful and systematic experiments made during the year the bureau will be able to adopt for the new destroyers a type of after body which will practically permit the speed of the flat stern type to be maintained, but will result in distinctly superior seagoing qualities, the flat stern type not being well adapted to rough water. Three vessels of the destroyer type were authorized by the last naval appropriation bill at a total cost for hull and machinery of \$750,000 each. On the conservative assumption that, with their improved seagoing capabilities, they will be only 1 per cent. more valuable than similar vessels previously designed, the Department will gain in these three vessels an increase in efficiency equivalent to the total sum expended during the year for the entire work of the experimental model basin." W. L. C.

### General Electric Improvements.

With the rapid growth of the General Electric Company's plant in Schenectady, N. Y., the iron foundry has been enlarged and equipped to handle an immense output. The additions to the main building and cleaning room make the main structure, 140 x 880 ft., with a wing, 120 x 170 ft., besides the gantry crane which covers the 50 x 450 ft. flask storage yard. The employees in this shop now number 1030; the building contains 214,000 sq. ft. of floor space; number of cupolas, 5; tons of castings produced a week, 550; number of castings produced a week, 45,000.

The use of compressed air in the iron foundry is one of the latest and most important labor saving methods ever adopted. Compressed air is now utilized in almost every operation connected with the making of a finished casting. Throughout this company's mammoth plants electrical distribution is exclusively used to run the machinery, either by individual drive or group drive—that is, the motors are applied directly to the machines or to drive a line shaft. But in the iron foundry, where the operations are scattered and intermittent, compressed air was found to be advantageous for small power services. While the work in this department is actually done by compressed air, the air in turn is supplied by a number of electric motor driven compressors of various capacities. The air, supplied at 80 lb. pressure, is but the medium between the real power, electricity, and the workmen. A compressor of 1700 cu. ft. a minute capacity, driven directly by a 225-hp. 10,000-volt motor, renders the iron foundry independent of the general compressed air service. On the main floor 63 Tabor molding machines, in constant use, are driven by the compressed air. The cars in the eight core ovens are operated back and forth in the same way. The jib cranes are equipped with compressed air lifting cylinders, greatly facilitating the handling of flasks. Compressed air operates the blowers in the cupolas, the heating and ventilating fans, the sand blast apparatus and the pneumatic clipping tools for dressing castings for delivery to the machine shops.

The Allgemeine Elektrizitäts-Gesellschaft of Berlin, the largest electrical concern in Germany, in its annual report states that the quantity of copper used in the cable plant at Oberspree amounted to 16,700 metric tons during the year.

### The National Steel Tube Cleaner.

The distinctive feature of the National steel tube cleaner, illustrated herewith and manufactured by the H. W. Johns-Manville Company, 100 William street, New York City, is that each blade acts independently of the others and is of so springy a nature that it conforms very snugly to the surface to be cleaned. It can be forced through the tube with very little effort and each blade takes part in removing the particles of sediment or scale within the tube. Another advantage of this cleaner is



The National Steel Tube Cleaner, Manufactured by the H. W. Johns-Manville Company, New York.

that it can be adjusted to fit various sizes of pipe, and if one or more of its blades become broken by rough usage or wear they can be readily repaired at nominal expense.

### The Assay of Tin and Terne Drosses.

BY CHAMBERS B. CAMPBELL.

For the determination of moisture 700 g. are placed in a weighed 6-in. porcelain evaporating dish and dried over night in an air bath at 110 degrees C. Five hundred g. and two sieves, one a 20-mesh, the other a 50-mesh, are used to separate the coarse from the fine. A good sized iron mortar is used and careful pounding is necessary to free entirely and clean the metal from the oxide and foreign matter or impurities.

For the assay samples take 100 g., according to the percentage of coarse and fine, but keeping the coarse, practically metal, to itself. Brush the fine into a large porcelain beaker and treat with nitric acid, 1 to 1, boiling sufficiently to get most of the iron, lead, zinc and sometimes copper into solution. An alloy of tin and iron is in danger of being dissolved more or less by nitric acid, but it is yet to be shown where stannic oxide, contaminated with iron, metallic or oxide, is dissolved by nitric acid.

Filter, washing well with hot water, and place the residue in a Battersea "T" crucible and burn off the filter paper. Place now with the cleaned and of course dry oxide, the metal part of the sample and 100 g. 98.99 per cent. potassium cyanide, mixing well with a spatula. Sprinkle a little of the cyanide on top.

A strong heat is required for the next procedure. A blacksmith's forge is satisfactory if the fire is kept up to the required temperature. Still better is a coke fire, similar to that used for the making of crucible steel. A good draft is steadier and softer than a blast. Get a hot fire, then throw in 6 in. of coke, put the Battersea crucible into it, surround it by large lumps and close up the hole. In half an hour's time a great white heat is reached and the crucible is ready to take out, though of course no specified time can be taken, this requiring an experience based upon circumstances and knowledge of the dross being assayed.

In pulling out the crucible give its contents a whirl or two, and tap the bottom lightly. Allow to cool until it may be touched with the bare hand. The button (generally free from iron) can now be weighed, and of course its weight determines the per cent. of tin in the dross.

To analyze the button, dissolve it whole in hydrochloric acid, 1 to 1, adding a little strong nitric from time to time. When all in solution make up in a graduated flask and use an aliquot portion, say 50 c. cm. Evaporate low, with excess of nitric acid, until meta-stannic acid forms. Filter, washing, and so forth, and weigh as stannic oxide.

Now to go back to the filtrate from the cleaned oxide and fine, which solution holds the bulk of the iron in the dross and practically all of the lead and zinc. Make up to the mark in the graduated flask and use an aliquot portion for analysis, say, 50 c. cm. Precipitate the lead with sulphuric acid and weigh as lead sulphate. Throw down the iron with ammonia and weigh as ferric oxide. To the filtrate from the hydroxide run in hydrogen sulphite gas, the filtrate containing a little mercuric chloride solution. Filter both sulphides and ignite off the mercury and burn the zinc to oxide.

When much sand is in the dross a silicate of tin may form and cause low results.

Below is given a method as used by a professional laboratory. A 20-g. assay sample of the dross is taken, five sieves, the meshes 20, 40, 60, 80 and 100 separating the coarse and metal from the oxide and fine, the weight of that which refuses to go through each mesh figured out to percentage in its relation to the whole sample, whatever it is, say a kilo. Eighty g. cyanide is used for the flux and reducing agent. No acid, alcohol or other treatment is gone through. Next follows the regular fire assay. The button is dissolved and made up to 1000 c. cm., and 50-c. cm. portions are used. If lead be present, as in aterne dross button, the solution must be kept hot, to keep the lead chloride in solution, and allowance must be taken for such a hot solution. Titrate for iron, using the well-known bichromate method. Run another solution complete, using the familiar ammonium sulphide. Start off by adding 50 c. cm. yellow ammonium sulphide (1 to 1 ammonia, saturated with hydrogen sulphide gas, till it no longer smells strongly of ammonia; add sulphur flowers until a real yellow color is imparted).

Make it strongly ammoniacal and run in hydrogen sulphide gas for a while. Filter on a 15-c. cm. No. 589 S. and S. paper, washing well with hydrogen sulphide gas water. The residue consists of sulphides of iron, lead, and perhaps other metals, but no zinc. The filtrate holds the tin in solution. Add 1 to 4 sulphuric acid drop by drop until slightly acid to litmus paper.

The tin is now precipitated and can be filtered and weighed as stannic oxide. The residue is washed into a beaker and a little hydrochloric acid added. Boil hard for about 5 min., then add a little nitric acid, when the solution will become clear. Determine lead, and so forth, as in a brass analysis.

### The Lap Seam Boiler Criticised.

As a result of the factory explosion and fire in Lynn, Mass., December 6, the fire underwriters may ask for legislation to prevent certain conditions believed to be contributory to the seriousness of this fire, where about \$400,000 of property was destroyed. The Underwriters' Bureau of New England has completed its inspection and several distinct recommendations are made, one of which is aimed at the lap seam boiler. The report says:

Any lap seam boiler is a distinct hazard in a factory, and any boiler, whether water tube, butt joint or lap joint, may explode, but with the experience which has developed from lap joint boilers, it is doubtful whether they should be allowed to remain in or close to factories. We would recommend a law preventing their use, particularly inside city or town buildings. It is therefore recommended that a distinct difference in fire hazard of a risk containing steam power units be recognized, depending upon the type of boilers installed.

If the recommendation appeals favorably to the underwriters involved in the Harney fire at Lynn, it is probable that rates will go up on factories that are using lap seam boilers.

The Pennsylvania Engineering Works, New Castle, Pa., has just completed a 400-ton blast furnace, together with stoves, piping, &c., for Corrigan, McKinney & Co., at Josephine, Indiana County, Pa. The general contract for this furnace was placed April 11, and it is noteworthy that the furnace was completed in exactly eight months and will be blown in early in January. This is said to break all former records for construction of a blast furnace of this size.

## The Mexican Iron Industry.

DURANGO, December 12, 1906.—Although the manufacture of iron and steel in this country is an industry of comparatively little importance, the consular representative of the United States in the City of Mexico has deemed it worthy of a report to the State Department. While this report contains nothing absolutely new to the readers of *The Iron Age*, and does contain some statements not in strict accordance with actual facts, it is not altogether without interest. The following extract is made from it:

Native pig iron does not appear to have made its appearance on the market until some three years ago. The only reason that I can find for this seems to be that the lack of proper fuel makes ironworking extremely expensive. I am told that it averages between 25 and 30 Mexican pesos (\$12.55 and \$14.94) per ton, and that therefore it proves cheaper to import pig iron. It would appear that of the pig iron used in Mexico at present about three-quarters is imported from England, and that a very small percentage comes from the United States. Some 10 years ago, while Mexico was yet in the beginning of its railroad history, the railroads sold their scrap to whomsoever would buy for remelting. Steel could not be worked here in those days, and all the old railroad steel appears to have been sold at Tampico for sometimes less than the freight from Tampico to Mexico City.

While it may be true that "native pig iron" has only been offered "on the market" within a few years, the manufacture of pig iron and its use for foundry purposes in Mexico can scarcely be said to be an infant industry. An ironmaking plant was in operation within a few miles of the city of Durango some 40 or 50 years ago. The ruins of this establishment may still be seen. The machinery for this plant was brought by wagon from the United States before the era of railroads. A member of the family of John Ball, an Englishman, whose son operates a foundry and machine shop in Durango at the present time, built the works and ran it with success for a long time. Speaking of the iron and steel works at present in existence, the consul says:

There is a steel plant in Monterey called the Fundición de Fierro y Acero de Monterey, whose president is an Italian, and whose paid up capital (said to be 10,000,000 Mexican pesos, or \$4,980,000 United States currency) is principally Mexican. This company has been a factor in the national development of the industry by being the means of obtaining the greater protective duties on rails and building material. It makes rails, and, generally speaking, all sorts of steelwork, but its chief output, I am told, is structural steel.

There are iron works, manufacturing wrought iron and mild steel, at Chihuahua (Compañía Industrial de Chihuahua); at Durango (Compañía de Fierro Nacional, with an American in charge); Ricardo Honey's works, near Pachuca, backed by combined Mexican and English capital; and the Mexican Central Railroad, at Aguascalientes, has a mill of goodly proportions, where it rerolls all its old wrought iron into bars, bolts and structural material, such as truss rods, brake beams, &c.

The plant of the Mexican National Iron & Steel Company, here referred to as being engaged in the manufacture of "wrought iron and mild steel" at Durango, has been out of operation for two years, and there is small prospect of its ever restarting. At the time of the shutdown it was reported—and the report, erroneous, as it proved to be, was confirmed by no less an authority than Dun's Agency—that a leading American iron and steel company had purchased the works and the large iron ore deposit near thereto. It transpired, however, that no such sale was made, and that the works closed because the operation of the plant was not profitable. The company, it is said, borrowed heavily from the local banks, and kept the works going in the hope of selling the property. When this hope failed to be realized operations ceased.

To give *The Iron Age* readers the full benefit of the consul's further discoveries a closing extract is made from his report:

There are a number of cast iron works in the City of Mexico, prominent among which are two large concerns—the National Iron & Steel Works (American) and Thomas Phillips & Co. (British), besides a number of smaller Mexican works. There are a number of similar concerns of varying importance scattered throughout the republic, and using scrap or pig iron imported from Monterey. The International Railroad, at Ciudad Porfirio Diaz, has furnaces where axles and car wheels are made for its own service.

### Railroad Concessions and Construction.

The Oaxaca & Pacific Railway Company has purchased the Oaxaca & Ejutla Railroad. The purchasers intend to extend and improve the road.

Good progress is reported as being made on the construction of the Morelia & Tacambaro Railroad. It is expected that the first division of 80 km. will be completed by March 1.

The Southern Pacific Railway Company is locating a line between the cities of Guadalajara and Tepic, by way of Tequesquite and Tequila.

### Industrial Notes.

A prominent Mexican farmer of the State of Puebla has been making efforts to induce the railroad companies to permit the introduction of farming machinery and implements from the United States at lower rates than the existing ones. The gentleman has been conducting experiments in improved methods of agriculture with successful results, and the local railroad officials have promised to assist him in his agitation for lower freight rates upon the classes of manufactured articles indicated for the general benefit of Mexican land cultivators.

The local trade of the Torreon machine shops is reported as being most active, a great deal of machinery of various kinds being shipped from that busy town to interior points.

A new foundry and machine shop are to be built by the Torreon Iron Works Company, orders for the material having already been placed.

Following the reported discovery of tin ore in the neighborhood of Aguascalientes, a movement is said to be afoot in which the Mitchell Mining Company is interested to erect a smelter in the district of the find to reduce the ore.

Max H. Lange has obtained a concession from the State authorities of Guerrero to use a large quantity of water from the River Azul for the purpose of generating electricity, with which to light the town of Quechultango, in that State.

J. J. D.

## An Interesting Pennsylvania Tax Claim.

HARRISBURG, PA., December 18, 1906.—Attorney General Carson has presented to the Dauphin county court a tax case considered of much importance to the State of Pennsylvania, being a claim for tax for 10 years on the capital stock of the Norfolk & Western Railroad Company to represent the value of such of its cars as come into Pennsylvania. D. E. Spangler, of Roanoke, superintendent of transportation of the Norfolk & Western, was on the witness stand for four hours and according to his testimony the company owns 1900 miles of railroad in Virginia and five other States. Its lines do not touch Pennsylvania, but at 61 different points connect with 41 different lines, some of which do connect with other lines of railroad reaching into Pennsylvania. He admitted that his company's cars frequently get into Pennsylvania loaded with freight for Pennsylvania points or for New York and New England. The company does not unload cars at State lines, but the necessities of quick transportation frequently require a car of one company to go all the way through States. His company charges the car to the account of the company receiving it at the junction point, but has no means of telling what States a car traverses after it leaves the junction point nor how long it stays in any State. He said the company's cars in the course of traffic reach every State east of the Mississippi and sometimes go into States beyond. He says his company neither owns, leases nor operates any line in Pennsylvania and its nearest point on the east is Hagerstown, Md., and Columbus, Ohio, on the west.

This is a test case to determine whether Pennsylvania can tax the thousands of cars of foreign railroads constantly passing from one end of the State to the other and which may be seen in nearly every long freight train. The court took the papers. In such cases the Dauphin county court has jurisdiction for the Commonwealth.

The Subway tunnel from the Battery, New York City, to Brooklyn, is now rapidly approaching completion. The headings of the north tube came together near the middle of the East River at 2.35 o'clock December 13, thus forming the first underground passage between New York and Brooklyn. This work has been in progress for more than three years.

# THE IRON AGE

1855—1906.

New York, Thursday, December 20, 1906.

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## The International Iron Situation.

The United States, Germany and Great Britain have had a peculiar interest in the past year—an interest increasing as the year advanced—in studying the developments in the iron and steel trades of the three countries. Two years ago the British pig iron trade, particularly the speculative side of it, quickened its pace in anticipation of a degree of prosperity in this country that has only developed within the past four months. Nearly two years after the attempted corner in Cleveland pig iron warrants was under full swing, in expectation of pig iron shipments to help out a shortage in the United States, the shortage actually came. It is significant, too, that prices in the British market have been carried in the past few weeks quite beyond the top figures of the Cleveland warrant gamble of 1904-1905. Then, amid excitement and a very extended public speculation, 54s. 6d. for Middlesbrough No. 3 iron was reached; recently, under the quieter conditions of a legitimate demand, with no manipulation by outside speculators, the price has gone to 63s. 6d.

After having occupied for some years the third position in the international iron and steel race, Great Britain more and more studies the signs in Germany and the United States to know what its iron trade may expect. It is now particularly watching for advance indications of a turn in Germany toward smaller consumption. While the United States for the time being is a moderate buyer of pig iron in the British market, the staple interest of Great Britain in the American iron trade is not due, as is its interest in Germany, to the tonnage it will be called on to export to this side, but rather to the harm that will result from increased American exports of steel if trade here drops off.

The British engineering press is already discussing a note of warning coming from Germany and the weight it should have in decisions relating to the future. The adverse influence of high money on industrial expansion is compelling attention. It is being recalled that a similar symptom was noted in Germany at the beginning of 1900, and in the spring of that year a sharp reaction occurred in the iron trade. It is pointed out that coal has now reached the high level of 1900, while pig iron, steel billets and finished materials are close to the prices then reached. The fact that speculation is not rampant in Germany to-day as was the case seven years ago constitutes an important point of difference. It is interesting to note that while some leaders in the iron trade there, like the more optimistic prophets in this country, predict prosperity lasting through 1907, there are others who advise short-time contracts, lest when the change comes many will find their business overextended. Naturally the expiration of the term of the German Steel Syndicate in June and whatever uncertainty exists as to its extension will affect buying in the early part of the new

year, apart from any influence of the money market. But it is significant to find cautionary signals hoisted at a time when all markets are buoyant and when the average buyer is showing no hesitation about contracts for a full half year ahead.

The extent of the expansion in the iron trade of Great Britain, Germany and the United States in the past year may be approximated by the increase in pig iron production. The cross currents in the export and import movement need not be regarded closely in this connection. Official statistics for the first half of 1906 are available for all three countries, and approximate returns for four months later in the case of Germany and five months later for the United States:

*Pig Iron Production in 1905 and 1906.—Gross Tons.*

	1905.	1906.†
United States.....	22,992,380	25,350,000
Germany* .....	10,987,623	12,300,000
Great Britain.....	9,592,737	10,100,000
Totals.....	43,572,740	47,750,000

\* Metric tons. † Estimated.

Approximately an increase of 4,200,000 tons, or nearly 10 per cent., is shown, the increase in the United States exceeding considerably the combined increase in Germany and Great Britain. For the first time in their history the blast furnaces of Great Britain, thanks to the demand from Germany, reinforced more recently by that from the United States, are expected to reach a total in excess of 10,000,000 tons.

The important question before the iron trade of the three countries as they enter upon a new year, is the duration of the present phenomenal demand for finished iron and steel. The high prices of raw materials in all iron making countries are a factor to which careful consideration must be given. In Great Britain the advance of \$1 a ton in Bilbao ore in the past year and the equal advance in the price of Durham coke, without corresponding advances in manufactured steel, have produced a condition that is not likely to go long unchanged. Further advances in finished material, together with higher labor cost, are bound to have an effect upon consumption. The questions of moment in this connection are, When? and How great an effect? While there is no essential value in an argument such as the one often heard, that because the exceptional demand of the past two years has been much greater and has lasted longer than expected the time of its diminution must be near at hand, some weight must be given to this phase of the situation along with the considerations of high commodity prices and dear money.

The expansion of producing capacity is a factor to which attention must be given, particularly in reckoning with the United States. Either a slight lessening of consumption in this country or a slight increase in production will make imports of pig iron unnecessary. The amount of new blast furnace capacity under construction in the United States or for which definite plans have been announced is enormous. Leaving out the second group of blast furnaces at Gary, Ind., which will not be completed until 1908, the new blast furnace plant now building or planned (including three additional Steel Corporation furnaces announced last week) represents 4,100,000 tons of pig iron a year. Most of this can be completed by the end of 1907. Active capacity in the United States at the end of next year might then easily reach 31,000,000 tons, with a liberal allowance for furnaces out for repairs. That the developments in the United States alone are likely to have an important influence upon the international situation in the coming year there is little reason to doubt.

### A Special Machinery Commissioner.

The movement to procure the appointment of a special Federal commissioner to investigate conditions abroad as they apply to the machinery business deserves favorable consideration, for it is one that may bring important results to a great American industry. The idea had its origin in the American Protective Tariff League, of which Charles A. Moore of Manning, Maxwell & Moore is president. It is understood that it has the indorsement of officials of the Department of Commerce and Labor, and it certainly has the support of all builders of machine tool and kindred equipment and of all other lines of machinery. The National Machine Tool Builders' Association is actively interested in the campaign to secure the necessary appropriation from Congress, and members of the House Appropriation Committee have stated that the movement will receive their hearty co-operation.

While the daily consular reports issued by the Government doubtless have their beneficial purposes in giving a general idea of conditions existing in other countries as they may affect American manufacturing and mercantile interests, yet they do not contain the kind of detailed information which the manufacturers of machinery would find really useful in a practical way. Specialized investigation is required if the purpose which the consular reports serve in a limited way is to be developed to the extent of bringing about increased markets, especially of inducing a demand for American machinery and making it grow more rapidly than is possible through the unaided efforts of manufacturers and their agents. The commissioner whom the machinery interests would have the Government send abroad, under direction of the Department of Commerce and Labor, would spend his time traveling in the manufacturing centers of Europe, for the purpose of obtaining information and investigating conditions and making reports to those manufacturers who are interested.

Two years ago Congress appropriated \$30,000 to be used in making a general investigation of foreign markets, with the intention of increasing the demand for American goods. Last year this sum was increased to \$50,000 through the influence of the cotton interests, with the understanding that the additional \$20,000 would be devoted to a specialized investigation of the cotton markets of the world. The results obtained from the expenditure of this money are stated to have been all that were expected. A real good has been accomplished, measured in the increased demand for American products abroad. The machinery interests now ask similar co-operation on the part of the Federal Government.

The cultivation of foreign markets for manufactures is not as well understood by Americans as it is by some other nations who have been longer in the field. While it is true that our exports of manufactured goods, including machinery, have grown handsomely in recent years, a vast amount of business is still possible for American manufacturers when they shall have learned not only where it is but how to get it. The foreign market for American machinery may be greatly extended by the application of scientific business methods. Although many American machine tool builders have their agents abroad who know conditions there, every dealer realizes that he must have the active and intelligent co-operation of the manufacturer if he is to procure the best results, and of course the manufacturer cannot give this assistance unless he is in close touch with conditions governing the field of the dealer's efforts. Every time a machine tool builder goes abroad he learns much that is to the advantage of his business, but he can absorb but little as com-

pared with what is yet to be learned before he can have a comprehension of conditions approximating his knowledge of affairs in his own country. A properly equipped Federal commissioner, with the entrée which his position would procure for him, should be able to learn essential facts bearing upon the machinery business which would be of importance to the manufacturers at home. He would be able to point out weaknesses in present methods of dealing with foreign customers and would suggest improvements. He would learn wherein American machines fail to strike the needs of various classes of customers, and thus enable the manufacturer to adapt his lines to conditions which are sometimes very different from those in this country. He would go into the intricacies of prejudices and predilections. Information of machinery requirements would be freshly obtainable from time to time and not belated, as is usually the case in the consular reports. Possibly his researches might have an important bearing on questions of tariffs of other countries.

The foreign market for American goods means vastly more when times are dull at home than it does to-day. Orders from abroad in times past have kept works running which would otherwise have been shut down because domestic orders were too few to pay for operating the plant. With a fully developed foreign trade extremes of business depression would probably be greatly modified. These various elements should influence the legislators at Washington. Congress, considering the appropriation strictly from a business point of view, and not at all because a limited body of men asks for it, should find it a most deserving and profitable measure. It should not be lost sight of that machine tools are not the only class of machinery which the Commissioner would investigate. Many other lines would be affected as favorably, under the rightly directed effort of an expert and tactful commissioner.

### A Menace to the Popularity of Concrete.

The accidents resulting from negligence or ignorance in the use of concrete for building purposes threaten to beget a lack of confidence in the material which may cause a reaction from its present growing popularity. Concrete, both in blocks and reinforced, is now accepted as a building material of the highest class. But it permits in its mixing the use of inferior materials and of unscientific combinations which, coupled with disregard of conditions pertaining to the work, may result in most serious consequences. Faulty construction with other building materials is entirely possible, but apparently concrete has greater possibilities of abuse, for the reason that its weaknesses can be better concealed, as a rule, and are not so well understood. Its growth in popularity has been exceedingly rapid, until it is being used for all classes of buildings, down to the most modest cottage. Its future seems full of promise; nevertheless, unless steps be taken to eliminate the element of negligence and fraud, the public will come to look upon concrete with suspicion and decline to accept it for domestic and business building purposes. It is now common to speak of concrete with the same glibness of familiarity as of brick or stone. The average man has small notion of what the material consists of, but is learning that it is originally a soft material, looking much like mortar. When a concrete building collapses because of defective construction the public's mind turns to the plastic stage of the material, and to the uninitiated the contemplation is one not conducive to confidence.

The collapse of a business block in process of con-

struction at South Framingham, Mass., last summer, in which a dozen lives were lost, affords an excellent instance of the negligent use of concrete, according to the expert report, just made public. It says:

The basement concrete pier foundations giving way was the primary cause of the disaster. These piers being 17 in. above the water level left 15 in. of water above the original bottom of the concrete piers. The concrete in these piers was fairly hard for 1 ft. more or less below the footing plates. Below this it was nearly as loose in some of the foundations as when placed in the box forms made to inclose the piers. . . . The appearance of some of this concrete indicated that it had been cast from some height into the water which stood in the box form. This would cause a separation of the cement from the gravel and sand. The concrete falling through the water, the ingredients would be separated, the heavier, the gravel and sand, falling in the bottom and the cement on top, and the strength of the work would be seriously impaired.

If this report be taken as a true statement of conditions as they existed at the time of the accident it may be seen that the collapse of the building was not at all due to concrete as a material, but to the persons responsible for its mixing, who were very likely ignorant of the consequences of what they were doing.

Probably the only remedies for this sort of thing are the better education of those who make use of concrete in building construction and a stricter inspection of buildings during the progress of construction. The architects can help greatly in this respect, for one of their duties is the careful watching of the work of building under their plans and specifications. Cement manufacturers will no doubt assist in a campaign of education, in their efforts to expand the market for their product. The enormous growth in the cement industry must be met with a corresponding increase in demand, and the manufacturers look to the builders as important customers of the future. But beyond all else strict rules governing all forms of concrete construction must be framed and enforced. It will not do for the designer to put the onus of accidents upon those who do the work. The intelligence and watchfulness of the designer or accredited inspector must be available through the various stages of preparation and construction. Research and actual use have now demonstrated a scientific practice in the mixing and application of concrete, and standards conforming to such practice must be defined and enforced by law. Otherwise disaster will follow disaster, until at length tenant and employee, owner and householder, will place concrete in the list of unsafe and undesirable materials of construction.

## CORRESPONDENCE.

### Method of Fluorspar Analysis.

To the Editor: In your issue of November 8 an article appeared on "The Analysis of Fluorspar for Open Hearth Steel Works," by Randolph Bolling, who claims to have devised and worked it out. The method described by him is almost an exact counterpart of my own devised and in use at the South Works laboratory of the Illinois Steel Company, and described in *The Iron Age* of August 27, 1903, over three years ago.

The only novelty, chemically, is the use of tartaric acid instead of a mineral acid, for liberating carbonic acid in its determination. Another variation is using 1 g. sample instead of  $\frac{1}{2}$ , a much larger amount of sulphuric acid, and applying the flame directly to the crucible with an asbestos plate interposed, while I directed only a couple of cubic centimeters, or enough to saturate the sample thoroughly, and evaporating the excess on a hot plate. How loss by spurling can be avoided in his modification is hard to understand. If the analysis given by him may be considered typical the adding up is slow, only 92.20 per cent. In our work 98 to 100.25 per cent. was regularly obtained, except whenever zinc and lead were present, when it added up to about 94 to 95 per cent., exclusive of those metals. As an example of the accuracy attained,

it may be stated that a shipment guaranteed to contain 95 per cent  $\text{CaF}_2$ , on analysis gave 93 per cent., but the adding up was only 98 per cent. Now the question naturally arose, whether the lacking 2 per cent. was  $\text{CaF}_2$ , or not. The sample was carefully reanalyzed, with the same result, and in addition 1.60 per cent. oxides of zinc and lead (not usually determined) were obtained. This made the final adding up 99.60 per cent., which was, of course, satisfactory.

Such a large amount of sulphuric acid as 10 c. cm. is wholly unnecessary, and only endangers loss by spurling and takes more time in its expulsion. There is also a possibility of losing some silica by a prolonged digestion. With a small excess of acid it was shown in my original article that the silica remains and can be determined as usually done in a silicate analysis, thus doing away with a separate determination.

As is well known hydrofluoric acid is made by treating fluorspar with concentrated sulphuric acid. In the analysis of spar decomposing by sulphuric acid it was first thought that the hydrofluoric acid formed would attack and evolve the silica as silicon fluoride; hence silica was at first determined separately by volatilization, until the accidental discovery was made that it remained after the sulphuric acid treatment. In spars containing barium sulphate, the latter will accompany the silica. I am glad to find Mr. Bolling corroborating my results, although he makes no comment in regard to silica.

ERIC JOHN ERICSON,

Chief Chemist Edgar Zinc Company.

St. Louis, Mo., December 12, 1907.

### Mechanical Draft.

The relative liability to derangement of a chimney as compared with a mechanical draft apparatus is thus discussed by J. H. Kinealy in his recent work entitled "Mechanical Draft:"

"Every engineer knows there is nothing about a chimney to get out of order, no machinery of any kind and no moving parts, and the only way a chimney can be put out of service is for it to fall. Thin gaged, sheet steel chimneys rust out quite rapidly and then are easily blown over; self-supporting steel chimneys, either lined or unlined, usually have a much longer life, the length of which depends naturally upon the thickness of the metal of which they are made and the care given to them; brick or stone chimneys when well built last practically forever, and when properly designed and erected do not fall unless struck by lightning or a cyclone. A mechanical draft apparatus, however, always comprises, in addition to the fan or blower, a motor of some kind for driving the fan or blower; so that there are moving parts, any one of which is liable to give trouble. In fact, a mechanical draft apparatus is a machine, liable to all the accidents and ills of a simple machine, and because of this fact it is necessary, when the draft depends entirely upon the mechanical draft apparatus and there is no chimney to fall back upon in case of an accident to the fan or its motor, to install duplicate fans and motors. When, however, there are duplicate fans and motors of the proper size, there is no more danger of a mechanical draft apparatus being put entirely out of service or becoming so deranged as to cause a shutdown of the entire power plant than there is in the case of a chimney of brick or stone."

An interesting event in the eastern Pennsylvania iron trade was the sixtieth anniversary of the Potts Bros. Iron Company, Limited, which was observed by that company at Pottstown, Pa., December 3. The works of the company are the outcome of the plant started December 3, 1846, under the name of the Pottsgrove Iron Works, by Henry and David Potts. The owners have changed several times, but a member of the Potts family has always been interested in it. The present company is composed of George H. Potts, chairman; Henry C. Hltnr, H. Leonard Potts, Charles R. Potts, H. W. Potts and Henry Potts. This ownership has existed since 1879, and the company has made a wide reputation for its boiler plates and pipe iron.

## A New Record in Lake Ore Shipments.

The last cargoes of Lake Superior iron ore have left upper lake ports in the past week and exact figures are now available, as furnished to *The Iron Age* by dock managers, showing the total movement by water in the season of 1906. As is well known, all the machinery of transportation, including iron range railroads, upper lake docks, vessels, lower lake docks and railroads leading from lower lake ports to furnace yards, has been under strain in the past season. And at that the amount of ore brought down is not what the shippers aimed to make it. But the season of navigation closed abruptly at the last, weather conditions being the determining factor, and shippers having no desire to tempt a repetition of the disastrous experiences in the closing days of the season of 1905.

The tabulation below shows that the total of water shipments in 1906 was 37,513,642 gross tons. Up to December 1 the total was 36,973,002 tons, so that December shipments this year were 540,640 tons against 405,060 tons in December, 1905. In the following table the shipments from the various ports in 1906 are given, together with corresponding figures for the three previous years:

Iron Ore Shipments from Upper Lake Ports.—Gross Tons.				
	1906.	1905.	1904.	1903.
Escanaba .....	5,851,095	5,307,938	3,644,267	4,277,561
Marquette .....	2,791,033	2,977,828	1,907,301	2,007,346
Ashland .....	3,388,111	3,485,344	2,288,400	2,823,119
Two Harbors .....	8,180,128	7,779,850	4,566,542	5,120,656
Gladstone .....	0	0	553	85,816
Superior .....	6,083,057	5,118,385	4,169,990	3,978,579
Duluth .....	11,220,218	8,807,559	4,649,611	5,356,473
Total by lake .....	37,513,642	33,476,904	21,226,664	23,649,550
Total by rail (1906 estimated) .....	750,000	876,552	596,175	640,328
Total shipments .....	38,263,642	34,353,456	21,822,839	24,289,878

The estimate given above for the all-rail shipments this year is purely tentative, in the absence of reports for the past year, as these are not made up until January and cover the calendar year. They include ore shipped to the charcoal furnaces of Wisconsin and Michigan, also to the Duluth furnace and to some of the coke furnaces in Wisconsin, and all the ore mined on the Baraboo range and at Iron Ridge in lower Wisconsin. The all-rail shipments in 1905 were exceptional, owing to the shipment of about 100,000 tons of Mesaba ore to Colorado. The indications are that the original estimates for 1906 shipments, which ranged about 38,000,000 tons, and which were revised, as the season progressed, to 36,500,000 tons and as low as 36,000,000 tons, have been exceeded. This has been the history of the trade in recent years, almost without variation. It is to be noted that the Mesaba range has furnished nearly all the 3,900,000 tons estimated increase in production in 1906 over 1905. This year the Mesaba sent out by water 23,685,156 tons, as against 20,025,963 tons by water in 1905, an increase of 3,659,193 tons. Last year's all-rail shipments from the Mesaba range were about 125,000 tons. The water shipments from the Vermillion range this year were 1,798,247 tons, making the total of water shipments from the two Minnesota ranges in 1906, 25,483,403 tons. This year the Mesaba range furnishes about 63 per cent. of the Lake Superior ore production, as against 58 per cent. in 1905, 56 per cent. in 1904 and 53 per cent. in 1903.

The United States Steel Corporation's water shipments this year were 20,978,651 tons, mine weights, as against 19,251,872 tons in 1905, or about 55 per cent. in 1906, as against 56 per cent. in 1905. The Steel Corporation's estimate of its shipments in 1907 is 23,000,000 tons and on that basis the total movement next year will be between 40,000,000 and 41,000,000 tons.

Graphite has been recommended by those who have tried it as an aid to better lubrication in cold weather. Almost any bearing that requires oil in it will work harder in winter than in summer, as the oil is bound to be more viscous when cold than when warm. Flake graphite with some thin mineral oil, it is reported, will improve the lubrication and the drag and slowness will disappear.

## The Steel Corporation to Build a Warehouse Near New York.

The United States Steel Corporation has offered through the Carnegie Steel Company to purchase a tract of land about 13½ acres in size, owned by the city of Newark, N. J., and located in the Waverly section of the city, which is desired for the erection of a large warehouse, to be used for storing structural material, sheets, plates and bars. A special meeting of the Newark Common Council will be held December 21 to consider the proposition. The land in question is known as the city's Potter's Field and part of it has been used as a burying ground for the indigent poor. The proposition to purchase it was made to a subcommittee of the Poor and Alms Committee, and the Carnegie Steel Company offered \$2000 an acre for the land, which offer the Aldermen who were delegated to receive it decided to recommend the Common Council to accept. An offer to buy the land at a similar price was made by John Francis Cahill, who is opposing the corporation's move and is trying to acquire the land for parties whose names he will not disclose.

The Newark Board of Trade is backing up the Steel Corporation's offer, and Frederick C. Faulks, who represents the latter, declared that it can secure plenty of land in the immediate vicinity if its proposition is not accepted. It is understood that the corporation will use the warehouse principally for the storage of structural material, in order to gain a better hold on the trade in the vicinity of New York. It is proposed to erect a building at a cost of about \$900,000, and its representative stated that if the city decides to sell the land the work of construction on the warehouse will be begun by April 1. In the event of the Common Council deciding not to take up the offer arrangements will be made, it is said, to secure adjacent property on which options have already been obtained.

**A Wheel Phenomenon Explained.**—In connection with a kinetograph view taken in Germany at the time of the visit of the King of Spain, a curious effect was noticed in the apparent direction of rotation of the carriage wheels in the procession. While the carriages moved in the line of march the wheels appeared to revolve slowly in the opposite direction, while in other views they were stationary, or else swayed slowly to and fro about the center. The explanation of this phenomenon, which at first puzzled all who saw it, lies in the fact that the photographs used in the kinetoscope are taken at intervals which, while very small, are still appreciable. In the case of a moving carriage wheel the rotation is suggested to the eye entirely by the displacement of the spokes. In a certain view a spoke occupies a well defined position. If the ratio between the rate of rotation of the wheel is such to the rate of photograph taking of the machine that in the next view some other spoke occupies this same position, the successive images of the wheel as thrown upon the screen will not differ from each other and the wheel will appear not to revolve. If the spokes have a slight relative lag it will result that the wheel will appear to move slowly backward, and any small alteration in the rapidity of rotation might produce on the screen effects which are, to say the least, startling.

From data alleged to have been surreptitiously secured from the British Admiralty it is learned that the famous battleship Dreadnought when run at full power over the measured mile developed a speed of 21.6 knots on 27,518 hp. On the full power eight-hour trial the speed was 21.25 knots on 24,712 hp., the revolutions of the turbines having been 329 per minute, in place of 337 per minute over the mile. The pressure of steam in the boilers (Babcock & Wilcox) was 241 lb. per square inch. The coal burned per indicated horse-power per hour during the eight-hour trial figured out at 1.51 lb., the steam having been 15.56 lb. and the water per pound of coal 10.03 lb.

## Wage Advances on the Iron Ranges.

### Shipments in 1906 from Important Mines.

DULUTH, MINN., December 15, 1906.—Wages all along the Lake iron mining region have been increased, the Oliver Iron Mining Company taking the initiative. The advance has been 10 per cent., and applies to all classes of mine operatives. A similar increase, or one of a slightly less percentage, was arranged among the copper mining companies a few days earlier, and it was not only advisable from an humanitarian point of view, but as a means of getting sufficient men. The iron mining advance affects about 28,000 men on the five ranges. It is quite possible that there will be difficulty in getting men enough to mine the ore the market will require the coming year, providing expansion is maintained, as now seems probable; and in part this will be the result of the deep snows of the winter, which have had a serious effect upon timber production and have caused lumbermen to do less winter logging than had been expected. This will add to their need for summer labor, and, combined with the tremendous demands to come from iron and copper mines, railroad construction, &c., for the summer, will make the Lake Superior labor question an interesting one. But the increasing proportion of Lake ore coming off the Mesaba and the increasing percentage of Mesaba won from open pit mines, make the labor factor less and less important relatively year by year.

### A Large Programme for Next Year.

Head of the lake shipments, that is, off the Vermillion and Mesaba ranges, have been as follows by roads:

	1906.	1905.
Duluth, Missabe & Northern.....	11,220,218	8,807,559
Duluth & Iron Range.....	8,180,128	7,779,850
Great Northern.....	6,083,059	5,124,000

The roads are now preparing to handle ore the coming year on a basis similar to that of 1906, as follows: Duluth, Missabe & Northern, 13,000,000 tons; Duluth & Iron Range, 9,000,000 tons, and Great Northern, 7,000,000 tons, or a total out of Minnesota of 29,000,000 tons, which above 1,850,000 tons off the Vermillion, is all Mesaba ore. It may very well be that these roads will not handle the amount of ore for which they are prepared, but it is worthy of note that the Duluth, Missabe & Northern, which moved less than 9,000,000 tons in 1905, set its mark last spring at 11,000,000 tons for this year, and slightly exceeded that total.

### Shipments from Important Mines.

Shipments out of some of the more important mines of the Lake district have been as below: Mountain Iron, 2,536,111 tons; Morris, 1,909,743; Burt, 1,376,874; Lake Superior (Mesaba), 2,257,420; Mahoning, 1,020,000; Stevenson, 1,015,000; Chapin, 947,650; Norrie, 850,000; Aragon, 430,000; Pioneer, 766,853; Fayal, 1,634,541; Adams, 1,238,349. From a number of Mesaba and Vermillion range mines not mentioned above shipments were made as follows:

Genoa .....	179,467	Tesora .....	12,001
Ajax .....	9,056	Chemung .....	227,120
Spruce .....	674,601	Higgins .....	114,199
Mohawk .....	92,715	Missabe Mts. ....	5,674
Hector .....	37,220	Chisholm .....	379,156
Elba .....	255,571	Clark .....	274,394
Corsica .....	100,606	Glen .....	279,424
Sparta .....	234	Meyers .....	228,451
Malta .....	115,762	Pillsbury .....	33,546
Minorca .....	151,530	Sellers .....	241,031
Cass .....	60,512	Tener .....	174,309
Mayas .....	107,244	Monroe .....	190,622
Bessemer .....	181,790	Iroquois .....	190,971
Union .....	20,691	Lincoln .....	367,192
Franklin .....	66,934	Troy .....	146,849
Pettit .....	82,756	Shenango .....	383,717
La Belle .....	50,466	Kinney .....	57,690
Miller .....	234,070	Minnesota .....	146,502
Biwabik .....	807,374	Chandler .....	318,990
Duluth .....	158,336	Zenith .....	181,580
Holland .....	95,472	Savoy .....	106,932
Victoria .....	64,819	Sibley .....	271,495
Adriatic .....	3,204		

### Iron Ore Prices.

Sales of iron ore for next year's delivery have been made of late without much regard to the prices announced as standard for the season. For instance, some 500,000

tons of Mesaba ore have been closed at 7.77 to 8.6 cents per unit, with these guarantees: Bessemer, guaranteed 54.29 per cent.; iron, natural, and 0.045 phosphorus at 8.6 cents; and non-Bessemer, running from 51.50 to 54.25 per cent iron, natural, at 7.7 and 7.8 cents per unit. These are large and important sales, and clean up the mines from which they are made. Mesaba producers have quite recently made sales for this year's delivery, and have so delivered at prices fully as high and in some few cases even above these figures. If they had been in position the past two or three weeks to increase these deliveries they might have secured even a better price, but they could not guarantee delivery, and it is well that they did not try, for the closing of navigation has come without much warning.

### Changes in Ownership.

Rumors have been current the past week to the effect that the Oliver Mining Company was to sell its Michigan mine, Menominee range, to Pickands, Mather & Co., and was to turn over perhaps all its properties in Iron County, Michigan, to the same buyer. It is decidedly contrary to the Oliver policy to sell mines, and the rumor is without foundation. The Oliver Company is more liable to buy mines than sell them.

Pickands, Mather & Co. are adding to their holdings all the time, and now have six Gogebic mines, most of them at the Sunday Lake end of the range. These include the Sunday Lake and Brotherton, the Mikado, Cary and Windsor, and the last taken is the Pike, an extension of the Brotherton ore lenses.

The New York State Steel Company, which has been busily engaged in picking up mines on the Mesaba range for some months, has taken a third property, one of the Congdon-Hartley group, containing a medium tonnage of ore of good structure. This gives the company an abundance of ore for some time to come, and it will now carry on explorations at various points in order to secure itself for the future.

At the Empire mine, Cascade range, a large Gates crusher is being installed and the mine put in readiness for the shipment of 200,000 tons next year. This is a lean siliceous ore, which is of the kind that used to be called "Mesaba's Friend." But owing to the rapid increase of late in silica content of Mesaba ores it is not in such demand as a mix, and must stand more on its own merits. The Empire will be a cheap property to operate, as there is but a thin sand capping over the ore, and when this is removed the property can be mined by the well-known milling system, while ore will be hoisted to the crusher and drawn directly by belt conveyors from the crusher to railway cars or pockets for loading.

D. E. W.

**The San Francisco Fire Loss.**—The report of the Special Committee of the Board of Trustees of the San Francisco Chamber of Commerce on insurance settlements after the big fire, which has just been published, says: The total area burned was about 3000 acres, or about 4.7 square miles, containing 520 blocks and about 25,000 buildings, one-half being residences. The amount of insurance covering property in the burned district was approximately \$235,000,000. The value of buildings and contents destroyed in the fire must have been about \$350,000,000, being an estimate upon the insurance liability, the known ratio of insurance to value (about 70 per cent.), and a guess that there was about 5 per cent. of property that carried no insurance. Final payments by the companies, it is declared, will be in the neighborhood of 80 per cent. of the amount of insurance involved. At Chicago 50 per cent. was paid, and at Baltimore 90 per cent.

The suit brought by Niven McConnell against the Passaic Steel Company, Paterson, N. J., for \$60,000, covering services as general manager for the unexpired portion of a 5-year contract term, came to trial last week. After two days had been given to the partial hearing of testimony it was announced that a settlement had been made and the suit, together with the counter claim of the company, was withdrawn.

## Technical Foundry Education\*

BY H. E. FIELD, PITTSBURGH, PA.

Foundrymen have for years urged that technical schools give more attention to foundry subjects. Those requests, however, have been so indefinite that the schools have been at a loss to know just what was required. Discussions which have arisen in associations and trade papers have been characterized by a confusion of ideas as to what would constitute a suitable school or course in foundry practice. This has been due to the fact that two distinct problems have been confounded. A clear understanding of this fact would make future work along this line more productive.

You are interested in foundry education in two definite ways: First, in the education of students who will advance into managers and engineers, and second, in the education of your molders and apprentices. It is an absurdity to suppose that one and the same course of education will answer for both conditions. The methods adapted to train a student to enter the foundry with an idea of eventually becoming an engineer or manager would not be the most effective for making a molder or an apprentice more proficient at his trade or fitting him for a foreman or superintendent. The material to be developed and the results aimed at are not the same, and an entirely different method of instruction will be necessary. This is caused by a situation which it will be impossible to change. The two conditions are not to be created, but are already in existence. The apprentice and the molder in the majority of instances have only a common school education. When a boy completes a high school training he seldom spends the time necessary to learn a trade. If the molder is to be educated a course of study must be organized which will take these facts into consideration.

### Foundrymen Should Demand Courses in Foundry Practice.

We look to our technical schools for a solution of the first of these questions, but find that they do not give the matter the attention which its importance warrants. There is a tendency to place this negligence at the doors of the schools and colleges. The fault lies to some extent with the foundrymen themselves. A concerted demand for courses in foundry practice, backed by applications from students, would help to bring forth the desired results. Schools are not given to creating demands, but rather to fulfilling them. The majority of such institutions are not overburdened with surplus funds, so that they are not warranted in erecting buildings and hiring instructors unless there is some indication that there will be a use for them.

There is no question in my mind that if a technical school should open a properly equipped foundry course with competent instruction there would be a response which would more than justify the outlay. This, however, is not after the manner of educational institutions. If we are to look to existing technical institutions for courses in foundry practice we must convince them of the need of such instruction, not merely with words, but with applications of students and demands for graduates. It was the great demand for educated electrical engineers which, a few years ago, forced all technical schools to install electrical courses. It will be the demand for foundry engineers that will necessitate such institutions adding foundry training. It lies with our associations to make these demands and to back them with a support that will insure success.

### Faulty Practical Instruction Now Given.

Several technical institutions have already installed small foundries which give the students opportunity to become familiar with the ordinary routine followed in making light castings. The foundry is in charge of a practical molder, who explains to the class as much about the mechanical side of molding as is possible in the few hours per week that are given to this branch of work. There is but one advantage to the student—

namely, he becomes familiar with the materials used in that special school. An equal amount of information could be acquired in any foundry in a week's time.

Such courses do not teach advanced foundry practice; in fact, they only illustrate it in its most antiquated form. Instead of being instructed in the most modern methods of making castings, the student is trained to do by hand what is now done with machines with a great saving of labor. The same fault exists in the teaching of cupola practice. The amount of coke and the proportion of expensive pig iron used would bankrupt a foundry working on a commercial basis. Careful attention is given to perfecting students in the use of hand ladles for pouring castings instead of teaching them the modern methods of handling iron by cranes, trolleys, &c. The present procedure gives the student no idea of economy in time or materials. It makes him impracticable and, to a certain extent, impossible until he has spent a year in getting rid of his antiquated ideas and another year in catching up to the times.

### An Ideal Foundry Course.

A foundry course to be of value should specialize in foundry practice; it should not merely teach molding from a mechanical standpoint. The reasons for making different castings in special ways should be explained; the occasion for the several methods of gating should be made clear, and demonstrations of properly and improperly gated castings shown. Feeding ought to be illustrated by examples showing the effect of different sizes and positions of risers. Castings correctly and incorrectly vented should be made to prove the importance of proper venting. The student ought to be given examples of the most modern methods of making different grades of castings. Machine molding, green sand, dry sand and loam work should be illustrated and the advantages of each explained.

It is more important that the student understand the principles which underlie the practical operation than that he be able to do the work with his hands. The mere ability to ram sand is of no value to the student; the value to him lies in being able to judge by the appearance of the castings whether the sand has been rammed too hard or not hard enough.

A school that turned out finished molders would be a valuable institution. It is not for this purpose, however, that we send students to technical schools. It is to have them taught those things which the practical molder with more limited view cannot see. Mere ramming of sand under an instructor who, nine cases out of ten, has never even had experience as a foreman does not teach them this. They must be taught to think and reason correctly as to cause and effect, and then they will prove of value in our foundries.

Students should also study different kinds and grades of foundry materials, such as sands, blacking, binders, &c., analyze them, note their composition and the effects of their use. They should be taught to analyze the iron, to make up the mixture and to analyze the resultant castings. Different grades of castings should be made, and thus give the opportunity to study the characteristic effect of various compositions on the physical structure.

Cupola changes should be studied and advanced cupola construction taught. The improved condition existing in the most modern foundries should be brought to the attention of the student by example when possible, and when not by lectures and illustrations.

### Collateral Instruction.

In addition to these subjects which pertain directly to the foundry, instruction should be given in metallurgy, electricity, mechanics, steam engineering, mathematics, drawing, &c., bearing in mind that time should be devoted to these subjects only in proportion to their relative value to foundrymen. For example, attention need only be given to that part of electrical and mechanical engineering which will prove of practical value to the foundry engineer in supervising the installation and operation of electrical and mechanical appliances in connection with the foundry. This point cannot be too strongly emphasized.

\* From a paper read before the New England Foundrymen's Association December 12, 1906.

## NEWS OF THE WORKS.

## Iron and Steel.

The Berger Mfg. Company, Canton, Ohio, is building an addition, 140 x 160 ft., to its rolling mill building to provide room for the six hot mills which were purchased from the Waukesha Rolling Mill Company, Waukesha, Wis. A new galvanizing building will also be built, 75 x 350 ft., and will be equipped with five pots. A power house 60 x 80 ft. is also under way.

E. W. Hill & Co., Birmingham, Ala., have received contract for skip filling apparatus for the Rockdale, Tenn., blast furnace of the Rockdale Iron Company, and are also designing repairs for the Rock Run, Ala., furnace of the Bass Foundry & Machine Company. This latter furnace, while now in operation, expects to go out of blast in the near future for needed repairs.

The Central Iron & Steel Company has prepared to blow in its No. 2 Paxton Furnace, at Harrisburg, Pa., which has been idle for about a year. The stack will be started about the first of the year, if not sooner. It is one of the well-known stacks of the Lower Susquehanna Valley and has been in practically continuous service since 1872. Ten years ago it was raised to its present height. The company has been operating its No. 1 Furnace steadily and is using the metal in its open hearth plant. The starting of this furnace will put all of the stacks in Dauphin County on the active list.

The sale of the plants of the Susquehanna Iron & Steel Company, Columbia, Pa., has been postponed by the court until Wednesday, February 13. December 1 was the first date set for the sale, but owing to the proposed plan of reorganization it was postponed for 30 days. It is understood that the further postponement was made in order to give the Reorganization Committee more time to complete its work.

The Montreal Rolling Mills Company, Montreal, Canada, is preparing plans for an extensive addition to its rolling mill department, consisting of a muck train with puddling and scrap furnaces. Property adjacent to that now owned by the company has been acquired, and to this will be transferred the entire handling of scrap for its preparation for the finishing mills. The finishing capacity will also be increased by the addition of a 10-in. Belgian train. The company is now moving its bolt and nut department to new quarters which have just been completed and is adding to the capacity by the purchase of new machinery.

## General Machinery.

The F. P. Richards Company has been organized at Springfield, Ill., with a capital of \$25,000, to engage in the manufacture of screw joint stove pipe, automatic flue fasteners and floor polishing machines. Considerable machinery for the manufacture of stove pipe and elbows will be purchased in the near future, and it is probable that a new plant will be erected on a site having direct railroad connections. R. M. Dockum is president; F. P. Richards, treasurer, and I. B. McMurtry, secretary and general manager.

The MacKinnon Mfg. Company, Bay City, Mich., boiler maker, founder and machinist, which was organized in 1867 by J. D. MacKinnon, has changed its name to the MacKinnon Boiler & Machine Company. No change has been made in the management of the business.

The Birdsall Engine Company, Auburn, N. Y., organized for the manufacture of the Birdsall skid, portable and traction engines, special hauling and contractor's engines, light road rollers and sawmills, has secured the plant known as the Conklin Boiler Works, which it is equipping and remodeling. Emery Caldwell is president; J. C. Weeks, vice-president; Henry O'Brien, secretary, and Walter A. Nye, treasurer.

J. W. Shealy, founder and machinist, Willson, N. C., is erecting a new machine shop, for which he will require a few machine tools in the early part of next year. The building, which will be of brick and steel, will be erected near his foundry, which was recently damaged \$1000 by fire.

The W. I. Kemp Company has been incorporated at Stratford, Ontario, with a capital stock of \$300,000, to manufacture machinery, implements, &c. The directors are: W. I. Kemp, Stratford, Ontario; N. J. Kemp and J. S. Lewis, Newark Valley, N. Y.

The Georgia Locomotive Company, Atlanta, Ga., recently incorporated, is establishing a plant for the repair and rebuilding of locomotives of all kinds which is expected to be ready for operation by the first of the year. The plant is located adjacent to the Georgia Car Company's works on Ridge avenue and the Southern Railroad and is now being equipped with modern machinery. The business will be under the supervision of W. H. Hudson, vice-president, formerly general master mechanic of the Western Division of the Southern Railroad, and Forrest Green, general manager.

Bids will be opened on Wednesday, December 26, at the office of the superintendent of school buildings, Park avenue and Fifty-ninth street, New York, for shop equipment for the Commercial High School on Albany avenue, Brooklyn, and the De Witt Clinton High School, Tenth avenue, in the Borough of Manhattan. The total amount of security required with bids is \$1100.

The New York State Steel Company is adding a two-story brick pump house and machine shop to its plant, now nearing completion at Buffalo, N. Y.

## Power Plant Equipment.

C. F. Dickinson, president of the Pittsburgh Industrial Iron Works, Pittsburgh, Pa., has purchased for the company the large works at Huntingdon, Pa., formerly owned by the Iron Car Company of New York and generally known as the Huntingdon Car Works. The plant is an extensive one and will be used by the new owners for the manufacture of hoisting engines.

The Spring Steel Fence & Wire Company, Anderson, Ind., has purchased all the equipment for its new Coffeyville plant except a 30 or 40 hp. engine which it will require.

The Bethlehem Steel Company, South Bethlehem, Pa., has secured contract to furnish pumps for the Baltimore pumping station amounting to \$500,000.

The Brown Engineering Company, Reading, Pa., has taken a contract to equip the power plant of the new silk mill to be established at New Holland, Pa., by Storb, Snader & Co.

Elyria, Ohio, is considering the question of erecting a municipal electric lighting plant and the city engineer has been instructed by the council to prepare estimates. It is proposed to have 200 arc lights.

The Canton Boiler & Engineering Company, Canton, Ohio, reports the sale of one 5000 hp. feed water heater and purifier, to be installed at the plant of the Berger Mfg. Company, Canton, to care for its increased power capacity. The same company will install a 300-hp. heater at the plant of the American Roll & Foundry Company, Canton.

Tate, Jones & Co., Incorporated, Pittsburgh, has secured contract from the Pennsylvania lines west of Pittsburgh for equipping the blacksmith shops at Ft. Wayne, Ind., with 12 large oil burning furnaces, work on which will be completed next month. This company is also equipping the open hearth steel furnaces of the Pennsylvania Malleable Company at McKees Rocks, Pittsburgh, and the Duquesne Steel Company at Kendall, Pa., with oil burning appliances to be used as an auxiliary in cases of natural gas failure. Seven of the large steel companies of the country are now using this oil burning system exclusively in their open hearth departments.

The Buffalo Gasoline Motor Company has increased its capital stock from \$50,000 to \$100,000 on account of enlargement of its factory and increase of output.

The Westinghouse Electric & Mfg. Company, Pittsburgh, Pa., denies the report that it is to build a plant in Italy.

## Foundries.

The Stockport Foundry Company, Stockport, Iowa, is being organized with a capital of \$100,000 to engage in the manufacture of ditching machines. The location of the plant has not yet been definitely decided upon.

The Youngstown Furnace & Supply Company, Youngstown, Ohio, has decided to purchase a site in Warren, Ohio, on which it will build a foundry and complete plant for the manufacture of furnaces, fittings, &c., as its present plant at Youngstown is too small to take care of its increasing business.

The National Foundry & Machine Works, New Haven, Fayette County, Pa., has been incorporated with a capital stock of \$20,000 by D. C. Springer, E. N. Stahl, J. T. Johnson, J. B. Eachard and Francis L. Rocks, Connellsville, and J. L. Cypher, New Haven.

The Lebanon Steel Casting Company, mention of whose incorporation was made in *The Iron Age* last week, will be an auxiliary to the M. H. Treadwell Mfg. Company, Lebanon, Pa. The officers of the company are Mr. Treadwell, Ralph McCarty of the Stoeber Foundry & Machine Works of Myerstown, Pa., and W. E. Farrell of Lebanon. The company will operate a foundry now being erected.

Powell & Colné, 11 Broadway, New York, agents for the Tropenas converter steel process, which is being generally introduced in this country for the manufacture of small and medium steel castings, have closed a contract for a new 2-ton Tropenas converter with the Reading Steel Casting Company, Reading, Pa., where they first installed the process for the then Brylgon Steel Casting Company. The Duquesne Steel Foundry Company, Coraopolis, Pa., has also contracted with them for a second 2-ton Tropenas converter.

If desired arrangements can be made regarding a railroad switch the Trumbull Mfg. Company, Warren, Ohio, will erect another foundry just east of its present one and will build several storehouses for material. This company is employing about 50 men.

The Fort Hill Bronze Company, Boston, Mass., will locate its new foundry, already mentioned in this column, in Everett, Mass. The building will be 40 x 100 ft. and one story.

The Baldt Steel Company, New Castle, Del., manufacturer of open hearth steel castings, intends soon to build some extensions to its plant.

The Indiana Foundry Company, Indiana, Pa., is about to enlarge its machine shop to double its present capacity and later will also considerably enlarge its foundry.

## Fires.

The plants of the Filbert Paving & Construction Company and the Stelliwagon Tar Paper Mfg. Company, Philadelphia, Pa., were burned December 15, the loss being about \$50,000.

The electric light plant of the Lewiston & Auburn Electric Light & Power Company, Auburn, Maine, was burned December 12, the loss being about \$20,000.

The plant of the New York Cement Company at Rondout, N. Y., was destroyed by fire December 13. The loss is placed at \$200,000.

The Pricedale plant of the Pittsburgh Coal Company, Pittsburgh, Pa., was damaged by fire December 13. The power house, containing six boilers and three dynamos, was destroyed.

The plant of the Moore Drop Forging Company, Springfield, Mass., was burned December 11, the loss being about \$20,000.

#### Hardware.

The A. Buch's Sons Company, Elizabethtown, Pa., manufacturer of lawn rollers, lawn swings, corn shellers, cast and steel troughs, castings, &c., is building quite an addition to its foundry. This will enable the company to take much better care of this part of its business.

The American Cutlery Company, Chicago, Ill., whose plant was partially destroyed by fire on the 14th ult., has a large portion of the factory again in working order. Contracts have been let for the rebuilding of the part which was destroyed on a larger scale than formerly, and the latest improved machinery will be installed.

The E. E. Josef Mfg. Company, Buffalo, N. Y., has enlarged its machine shop from 2000 to 4000 sq. ft. and its specialty department from 3000 to 5000 sq. ft. The office of the company has been removed from the third floor of 72 Washington street to the second floor of 14 Perry street, affording still more space for manufacturing. A number of specialties have recently been added to the company's line.

The Monitor Specialty Company, Omaha, Neb., has been incorporated with a capital of \$20,000 to engage in the manufacture of hardware specialties. It is placing on the market and will make a specialty of the manufacture of an automatic basting roasting pan. The officers of the company are: D. G. Walker, president, and N. J. Ramekers, treasurer.

The El Dorado Hardware & Mfg. Company has been organized at El Dorado, Ark., with a capital stock of \$4400, to engage in the manufacture of spokes, handles, wagon, buggy, carriage and plow woodstock generally. The company's plant is equipped with ten machines and to provide additional manufacturing facilities two more buildings will be erected in the near future and one or more sawmills will be added. The officers of the company are: J. F. Mellor, president; D. K. Hudson, vice-president; T. J. Emerson, secretary and treasurer.

The O. K. Tool Holder Company, Shelton, Conn., manufacturer of the O. K. tool holders and tools for lathes, planers, shapers, &c., is nearly ready to move into its new plant. Last spring the company purchased a plot of ground 100 x 500 ft., having a spur of the New York, New Haven & Hartford Railroad on one end of the property and wharfage privileges on the other end, and started the erection of a machine shop building and drop forge shop. The machine shop, erected on the westerly end of the property to allow for future extensions, is a modern reinforced concrete structure, fireproof in every way, 40 x 70 ft. and four stories high, guaranteed to stand a floor load of 400 lb. to the square foot. Part of the top floor of this building will be partitioned off for office purposes. The building will have everything in the way of modern improvements, such as electric freight elevator, hot water heating, Nernst electric lights, &c. The drop forge shop, erected on the easterly end of the property, is an all steel building so designed that in hot weather the four sides of the shop can be thrown open, thus insuring as cool a place to work in as possible. This building and the machine shop will be connected by an industrial railroad starting at railroad spur and running through machine shop and down the property to drop forge shop, with a branch to wharf. Power for all purposes will be alternating electric current furnished by the local company at a low rate. The company will move all machinery of any use from the present plant to the new one. The company has also purchased new machinery to be delivered when in possession of the new plant, as there is no room in the present quarters.

The Consolidated Hardware Mfg. Company, Hamilton, Ontario, has been incorporated to manufacture tacks, wire, tools, &c., with a capital of \$40,000. The provisional directors include T. H. Wynn, F. Forsyth and C. H. Brigger of Hamilton.

The Modern Bedstead Company has been organized at Cornwall, Ontario, and will build a plant for the manufacture of iron and brass bedsteads, &c.

The Weaver Hardware Company has been incorporated at Rochester, N. Y., to manufacture specialties in hardware, with a capital of \$50,000. The incorporators are C. F. Weaver, B. P. Weaver and E. W. Perry, all of Rochester.

#### Miscellaneous.

The Philadelphia Pipe Bending Company, Philadelphia, Pa., which was recently incorporated with a capital stock of \$50,000, has purchased the plant and business of the Philadelphia Pipe Bending Works, which it will continue. Ample capital is provided for extensive improvements. J. W. Johnson is president and G. M. Harden, secretary and treasurer.

It is reported that a large company is in process of formation at Pittsburgh to engage in the manufacture of steel cars.

Details regarding it are somewhat meager, but reports are that its capital will be \$5,000,000 and that it will be ready to make steel cars by December 1, 1907. It is claimed that New York, Cleveland and Pittsburgh capitalists will be identified with the new company.

The Driggs-Seabury Ordnance Corporation, Sharon, Pa., advises us that the report that it would make large additions to its plant is incorrect. The company is running double turn and has a very large amount of business in projectiles on its books.

The Aladdin Rubber Company, Akron, Ohio, has increased its capital stock from \$100,000 to \$250,000 and in the near future will erect a large addition to its plant at Barberton. The company is engaged in the rubber reclaiming business.

The Gelser Mfg. Company, Waynesboro, Pa., has elected the following directors for 1907: J. J. Oller, D. M. Good, J. A. Midower, George B. Beaver, Jay F. Shank, A. D. Morganthall, S. M. Kitzmiller, J. E. Rohrer, A. E. Price and W. T. Omwake, all of Waynesboro. The dividend declared was 7 per cent., and a good outlook for the new year is reported.

The Pennsylvania Steel Company is pushing work on its coke ovens at Steelton and one battery may be started early next month.

The American Car & Foundry Company has had its new steel car plant at Madison, Ill., in operation for several months, building from 40 to 50 cars per day, and expects to begin the construction of steel cars at its new plant at St. Louis, Mo., next March. The construction of this latter plant, which was commenced last June, has reached a point where the erecting department is under cover, the templet building completed and the power house well under way. A great many of the machines have arrived and are being installed in this plant, which will have a minimum capacity of 50 cars a day. These two plants were constructed under the supervision of the company's own engineers and are built of steel, brick, stone and cement, making them fireproof.

The Schoen Steel Wheel Company, Pittsburgh, is completing the installation of eight large regenerative heating furnaces at its McKees Rocks works. These, in connection with other extensive improvements and additions which have been made to the plant, will double its present capacity.

The Worcester Stonebrick & Tile Company, Worcester, Mass., has been organized to manufacture sandlime brick by the Huennekes process. The company will occupy the buildings known as the Arnold & Pierce Foundry. The officers are: President, Ethel O. Knight; treasurer, Stillman F. Morse, and clerk, Henry S. Bacon. The authorized capital stock is \$25,000, of which \$5000 has been issued.

The Jones-Bertsch Company, 357 Cambridge street, Boston, has been incorporated to manufacture gas and electric fixtures and do bronzing, spinning, brazing, &c. The capital stock is \$15,000. Edwin P. Jones is the treasurer and Harris M. Richmond, clerk, who with J. L. Bertsch constitute the Board of Directors.

The Struthers Coal & Coke Company has begun work on 40 additional ovens at Fairbank, Fayette County, Pa. On their completion, in February, 1907, the company will have a total of 200 ovens.

The Percival Plow & Stove Company has been incorporated at Merrickville, Ontario, with a capital stock of \$200,000, to manufacture plows and implements and stoves, furnaces, &c. J. B. Waddell, Smith's Falls, Ontario; E. W. Stickney, and R. C. Percival, Merrickville, are the provisional directors.

The Union Carbide Company, Niagara Falls, N. Y., will build a factory adjoining its present plant in that city to be used for preparing raw materials required in the manufacture of calcium carbide. The new building will be of brick and steel, 64 x 240 ft.

The Dunkirk Railway Safety Device Mfg. Company has been incorporated at Dunkirk, N. Y., with a capital stock of \$20,000, to manufacture safety devices for railroads. The incorporators are A. J. Pleszak, L. J. Pfeeger and A. M. Mann, Dunkirk.

Ivanhoe Furnace at Ivanhoe, Va., made Bessemer iron in November using part Lake Superior and part native ores. This is probably the first production of Bessemer iron in Virginia from a mixture into which native ores have entered. In 1903 one Virginia furnace produced about 1000 tons of Bessemer iron from Lake Superior ores and it is believed that in 1887 a small amount of Bessemer iron was made in Virginia from imported ores, though definite information on this last named instance is wanting.

Concerning the report that the Parkgate Iron & Steel Company will establish works in India, British engineering papers quote Col. C. J. Stoddart, managing director, to the effect that the company will go ahead with the project as soon as the money market is favorable. The plans involve an outlay of \$1,500,000. A rail mill is to be a part of the plant.

## The Iron and Metal Trades

Activity has centered during the last two weeks in the Eastern Pig Iron markets where buyers have taken hold of covering requirements for the third quarter. In some cases these have extended throughout the last quarter, and in others the second quarter is included. During the past two weeks eastern Pennsylvania mills have bought about 75,000 tons of Basic Pig, for delivery during the third quarter chiefly, the price having been \$22 delivered and upward. Some additional business is pending. Foundry interests have continued to buy for forward delivery, among them the largest concerns, who seem to have confidence in the future. Present prices are regarded by many in the trade as dangerously high, for the basis of distant commitments, and yet it is the consumer who is most eager to take his chances. Southern makers have advanced their price for the third quarter from \$17.50 to \$18 for No. 2 Foundry, Birmingham, and have booked some tonnage at that.

The situation in the South is growing more serious, through inadequate transportation facilities and scarcity of labor. Iron is accumulating at the furnaces which is sorely needed by distant melters, and the delivery of raw materials seems to be becoming more and more precarious.

There has been less activity in Foreign Foundry Irons lately. The Middlesbrough market showed some decline but has rallied again on heavy buying.

Rail makers have been booking some additional good orders, among them being 19,000 tons for the Texas Railway, 15,000 tons additional for the Great Northern, 7000 tons for the Spokane Inland and 5000 tons for the Monon road. There is an inquiry in the market for a lot of 25,000 tons from a Western road.

Eastern Plate makers have been forced again to put up their prices \$2 per ton, making the third advance of like amount during the current month. The manufacturers state that while they are loath to take such action they are forced to it through rising costs.

Quite a good run of small sized structural contracts has come in. Among them are 3000 tons for a building at St. Louis, 2500 tons for the Fall River Bridge, 2400 tons additional for Gary and 1500 tons for two buildings in San Francisco. Some large contracts are still pending. The bids for the 8300 tons for the Blackwell's Island Bridge are in, but no award has yet been made.

In the lighter lines the trade is looking for an early advance in Sheets and in Tin Plates. Bars are strong and are now quotably higher in the East.

Complete returns to *The Iron Age* show that the total water shipments of Lake Superior ores in 1906 were 37,513,642 gross tons. All-rail shipments to blast furnaces in the Northwest will bring the total close to 38,250,000 tons. This is an increase of approximately 3,900,000 tons over 1905, all but 300,000 tons of which is to the credit of the Mesaba range. The Steel Corporation's shipments were 20,978,651 tons. Its programme for 1907 is 23,000,000 tons.

## A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,  
Declines in Italics.

At date, one week, one month and one year previous.

	Dec.19, 1906.	Dec.12, 1906.	Nov.21, 1906.	Dec.20, 1905.
<b>PIG IRON, Per Gross Ton:</b>				
Foundry No. 2, Standard, Philadelphia	\$24.50	\$24.50	\$23.75	\$18.25
Foundry No. 2, Southern, Cincinnati	25.00	25.00	25.00	16.75
Foundry No. 2, Local, Chicago	25.50	25.50	25.50	19.25
Bessemer, Pittsburgh	23.85	23.85	22.85	18.35
Gray Forge, Pittsburgh	22.85	22.85	22.85	17.10
Lake Superior Charcoal, Chicago	26.00	26.00	25.50	20.00

<b>BILLETS, &amp;c., Per Gross Ton:</b>				
Bessemer Billets, Pittsburgh	29.50	29.50	29.50	26.00
Forging Billets, Pittsburgh	36.50	36.50	36.50	30.00
Open Hearth Billets, Phila.	34.00	33.00	33.00	30.00
Wire Rods, Pittsburgh	37.00	37.00	37.00	32.50
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00

<b>OLD MATERIAL, Per Gross Ton:</b>				
O. Steel Rails, Chicago	20.50	20.50	20.50	16.50
O. Steel Rails, Philadelphia	20.00	20.00	19.50	18.25
O. Iron Rails, Chicago	28.00	28.00	28.00	23.00
O. Iron Rails, Philadelphia	27.75	27.75	26.50	24.50
O. Car Wheels, Chicago	25.25	25.00	23.00	19.00
O. Car Wheels, Philadelphia	23.00	23.00	22.50	18.75
Heavy Steel Scrap, Pittsburgh	20.00	20.00	18.50	17.50
Heavy Steel Scrap, Chicago	17.50	17.50	17.50	15.00

### FINISHED IRON AND STEEL,

	Per Pound:	Cents.	Cents.	Cents.	Cents.
Refined Iron Bars, Philadelphia	1.83½	1.83½	1.83½	1.83½	
Common Iron Bars, Chicago	1.76½	1.71½	1.71½	1.85	
Common Iron Bars, Pittsburgh	1.80	1.80	1.80	1.90	
Steel Bars, Tidewater, New York	1.74½	1.74½	1.74½	1.64½	
Steel Bars, Pittsburgh	1.60	1.60	1.60	1.50	
Tank Plates, Tidewater, New York	1.84½	1.84½	1.74½	1.74½	
Tank Plates, Pittsburgh	1.70	1.70	1.60	1.60	
Beams, Tidewater, New York	1.84½	1.84½	1.84½	1.84½	
Beams, Pittsburgh	1.70	1.70	1.70	1.70	
Angles, Tidewater, New York	1.84½	1.84½	1.84½	1.84½	
Angles, Pittsburgh	1.70	1.70	1.70	1.70	
Skelp, Grooved Steel, Pittsburgh	1.65	1.65	1.65	1.55	
Skelp, Sheared Steel, Pittsburgh	1.70	1.70	1.70	1.65	

### SHEETS, NAILS AND WIRE,

	Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, No. 27, Pittsburgh	2.50	2.50	2.50	2.20	
Wire Nails, Pittsburgh	2.00	2.00	1.90	1.80	
Cut Nails, Pittsburgh	2.05	2.05	1.95	1.70	
Barb Wire, Galv., Pittsburgh	2.45	2.45	2.35	2.25	

	Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake Copper, New York	23.00	23.00	22.50	19.00	
Spelter, St. Louis	6.55	6.50	6.25	6.50	
Lead, New York	6.30	6.12½	6.05	6.00	
Lead, St. Louis	6.15	5.92½	5.87½	5.80	
Tin, New York	42.57½	42.85	42.70	36.37½	
Antimony, Hallett, New York	25.00	25.00	25.00	13.00	
Nickel, New York	45.00	45.00	45.00	40.00	
Tin Plate, Domestic, Bessemer,					
100 lb., New York	\$4.09	\$4.09	\$4.09	\$3.59	

## Chicago.

FISHER BUILDING, December 19, 1906.—(By Telegraph.)

Preparations to meet a daily demand for approximately 2500 tons of Plates and Shapes in 1908 are reflected in the new construction programme of the United States Steel Corporation, which provides for the doubling of the Iron and Steel producing capacity of the new plant of the Indiana Steel Company, Gary, Ind. The Standard Steel Can Company, Pittsburgh, has already begun the erection of a plant at Hammond, which will have an output of 100 cars daily, while the Pullman Company is having plans prepared for a \$5,000,000 plant. It is rumored that another car company has been attracted to this district, as a result of Gary operations, and the indications are that the capacity provided will not be greatly in excess of the consumption. Inquiry for Iron for third quarter shipment is heavy. Southern grades have advanced to \$18 and \$18.50 for No. 2. Sales aggregating 2500 tons have been made on the latter basis of a grade that customarily commands an advance of 50c. a ton. The advent of the year end inventory period has resulted in no appreciable decline in the volume of specifications for finished material, although buying is limited and is for immediate requirements only. Several Eastern Plate mills have withdrawn from the market for the first half, and have opened their books for deliveries through the last six months on the basis of 1.70c. to 1.80c., Pittsburgh. Up to the present little tonnage has been placed at these prices. The Steel for two buildings to be erected at San Francisco, amounting

to 1500 tons, has been placed with the American Bridge Company, and the Cambria Steel Company has booked 3000 tons for a building at St. Louis. Contracts for 1800 tons for the Halsted street bridge and 25,000 tons for the Chicago & Milwaukee Electric Railway Company's power station remain unplaced. Electric road demand for Rails for 1907 is heavy, 3000 tons having been placed this week, while numerous other inquiries are pending. An advance on Black and Galvanized Sheets is rumored, but while premiums of \$1 a ton are readily secured on small lots for prompt needs, official quotations are unchanged.

**Pig Iron.**—Merchants who were offering Southern Iron last week for the third quarter on the basis of \$17.50, Birmingham, for No. 2, have revised their prices and are asking \$18 to \$18.50. The ease with which sales were made on the low basis indicated that consumers considered the price a favorable one, and after a comparatively limited tonnage was placed quotations were advanced 50c. and \$1 a ton. Northern operators have not yet determined upon prices for the last half and are not anxious to quote, although consumers are besieging them with inquiries. The spot demand is heavy and sales of Southern No. 2 are being made on the basis of \$26.90, Chicago. For January delivery a concession of 50c. a ton is made, while for the remainder of the first quarter \$26.15 is quoted. For the second quarter \$19.50 to \$20, Birmingham, is quoted, and the tonnage available is extremely small. Quotations for first quarter shipment, f.o.b. Chicago, including the 25c. advance in freight rates on Southern grades, are as follows:

Lake Superior Charcoal.....	\$26.00 to \$26.50
Northern Coke Foundry, No. 1.....	26.00 to 26.50
Northern Coke Foundry, No. 2.....	25.50 to 26.00
Northern Coke Foundry, No. 3.....	25.50 to 26.00
Northern Scotch, No. 1.....	26.00 to 27.00
Ohio Strong Softeners, No. 1.....	26.00 to 26.50
Ohio Strong Softeners, No. 2.....	25.50 to 26.00
Southern Coke, No. 1.....	26.65 to 27.15
Southern Coke, No. 2.....	26.15 to 26.65
Southern Coke, No. 3.....	25.65 to 26.15
Southern Coke, No. 4.....	25.15 to 25.65
Southern Coke, No. 1 Soft.....	26.65 to 27.15
Southern Coke, No. 2 Soft.....	26.15 to 26.65
Southern Gray Forge.....	23.15 to 23.65
Southern Mottled.....	22.65 to 23.15
Malleable Bessemer.....	26.00 to 26.50
Standard Bessemer.....	25.30 to 25.80
Jackson Co. and Kentucky Silvery, 6 %	27.30 to 27.80
Jackson Co. and Kentucky Silvery, 8 %	29.30 to 29.80
Jackson Co. and Kentucky Silvery, 10 %	31.30 to 31.80

**Metals.**—Effective December 17, Sheet Zinc was advanced to \$8.25 per 100 lb. in 600-lb. casks, f.o.b. Peru or La Salle, and Lead was advanced \$5 a ton. Copper is also higher, and the upward movement has brought many buyers into the market who had deferred covering their requirements in anticipation of lower values. Old Metals have likewise shared in the advance. We quote: Casting Copper, 24½c. to 25¼c.; Lake, 24½c. to 25¼c., in car lots for prompt shipment; small lots, ¼c. to ¾c. higher; Pig Tin, car lots, 45½c.; small lots, 45¾c.; Lead, Desilverized, 6.50c. to 6.60c., for 50-ton lots; Corroding, 7.25c. to 7.35c., for 50-ton lots; on car lots, 2¼c. per 100 lb. higher; Spelter, 6.75c.; Cookson's Antimony, 28½c., and other grades, 26½c. to 27½c.; Sheet Zinc is \$8.25 list, f.o.b. La Salle, in car lots of 600-lb. casks. On Old Metals we quote: Copper Wire, 19½c.; Heavy Copper, 19¼c.; Copper Bottoms, 18½c.; Copper Clips, 19c.; Red Brass, 18½c.; Red Brass Borings, 15¼c.; Yellow Brass, 15c.; Yellow Brass Borings, 13¼c.; Light Brass, 11¾c.; Lead Pipe, 5.50c.; Tea Lead, 5c.; Zinc, 5c.; Pewter, No. 1, 28c.; Tin Foil, 34c.; Block Tin Pipe, 27½c.

(By Mail.)

**Billets and Rods.**—None of the local mills has quoted on an inquiry for 2000 tons of Rolling Billets for Kansas City delivery during the months of February and March, and it is probable that this consumer will be forced to substitute Old Steel Axles. The market for this reason is not quotable. Wire and Chain Rods are held at a prohibitive price, only occasional car lots being sold at \$40, f.o.b. Chicago.

**Rails and Track Supplies.**—A contract for 3500 tons of Standard Section Rails has been placed by an electric road with the Cambria Steel Company, and the Chicago & New York Air Line has purchased 500 tons from the same company. The inquiry for electric road extensions is heavy, and considerable tonnage will be placed within the next few weeks. There has been no decline in the demand for Light Rails, although deliveries do not meet consumers' requirements. We quote: Angle Bars, accompanying Rail orders, 1907 delivery, 1.65c.; car lots, 1.90c.; Spikes, 2.25c. to 2.50c., according to delivery; Track Bolts, 2.65c. to 2.75c., base, Square Nuts, and 2.80c. to 2.90c., base, Hexagon Nuts. The store prices on Track Supplies range from 0.15c. to 0.20c. above mill prices. Light Rails, 30 to 45 lb. sections, \$33; 25-lb., \$34; 20-lb., \$33; 16-lb., \$36; 12-lb., \$37, f.o.b. mill. Standard Sections, \$28, f.o.b. mill, full freight to destination.

**Structural Material.**—The Cambria Steel Company has been awarded a contract for 3000 tons of Shapes, to be used in the erection of a St. Louis office building. Current orders, although small, are numerous, and the tonnage is satisfactory in the aggregate. Specifications are also keeping up well, and

the general conditions in the trade have materially improved. Shipments from stock, which are still being made on the basis of 2.05c. to 2.10c., are light, owing to improved mill deliveries. Mill quotations are unchanged, as follows: Beams and Channels, 3 to 15 in., inclusive, 1.86½c.; Angles, 3 to 6 in., ¼-in. and heavier, 1.86½c.; larger than 6 in. on one or both legs, 1.96½c.; Beams, larger than 15 in., 1.96½c.; Zees, 3 in. and over, 1.86½c.; Tees, 3 in. and over, 1.91½c., in addition to the usual extras for cutting to extra lengths, punching, coping, bending and other shop work.

**Plates.**—Several of the Eastern mills are now out of the market on both Sheared and Universal Plates for shipment through the first half of next year and have opened their books for last half delivery on the basis of 1.70c. to 1.80c., Pittsburgh. Specifications, especially from Steel car manufacturers, are unusually heavy and are crowding the mills to their utmost capacity. We quote: Tank Plates, ¼-in. and heavier, wider than 6¼ and up to 100 in. wide, inclusive, car lots, Chicago, 1.76½c. to 1.86½c.; 3-16 in., 1.86½c. to 1.96½c.; Nos. 7 and 8 gauge, 1.91½c. to 2.01½c.; No. 9, 2.01½c. to 2.11½c.; Flange quality, in widths up to 100 in., 1.86½c. to 1.96½c., base, for ¼-in. and heavier, with the same advance for lighter weights; Sketch Plates, Tank quality, 1.86½c. to 1.96½c.; Flange quality, 1.96½c. Store prices on Plates are as follows: Tank Plate, ¼-in. and heavier, up to 72 in. wide, 2c. to 2.10c.; from 72 to 96 in. wide, 2.10c. to 2.20c.; 3-16 in., up to 60 in. wide, 2.10c. to 2.20c.; 72 in. wide, 2.35c. to 2.45c.; No. 8 up to 60 in. wide, 2.15c. to 2.25c.; Flange and Head quality, 0.25c. extra.

**Bars.**—On Steel Bars the Illinois Steel Company has its output sold practically through 1907, and accumulated specifications cover four months' output. The high cost of Scrap and the shutting down of one of the Western mills have strengthened the Iron Bar market, and the minimum price which the mills will entertain is 1.76½c., Chicago, while prompt lots are being sold as high as 1.85c. We revise quotations as follows: Iron Bars, 1.76½c. to 1.81½c.; Steel Bars, 1.76½c., both half extras; Hoops, 2.16½c., extras as per Hoop card; Bands, 1.76½c., as per Bar card, half extras; Soft Steel Angles and Shapes, 1.66½c., half extras. Store prices are as follows: Bar Iron, 2.10c. to 2.25c.; Steel Bars, 2c. to 2.10c.; Steel Bands, 2c., as per Bar card, half extras; Soft Steel Hoops, 2.35c. to 2.45c., full extras.

**Sheets.**—There have been rumors of an early advance on both Black and Galvanized Sheets, although no official announcement has yet been made. Sales for early delivery continue at a premium of \$1 a ton, and high prices can readily be secured on large lots from warehouse stocks. Quotations are unchanged as follows: Blue Annealed, No. 10, 1.96½c.; No. 12, 2.01½c.; No. 14, 2.06½c.; No. 16, 2.16½c.; Box Annealed, Nos. 17 to 21, 2.51½c.; Nos. 22 to 24, 2.56½c.; Nos. 25 and 26, 2.61½c.; No. 27, 2.66½c.; No. 28, 2.76½c.; No. 29, 2.86½c.; No. 30, 2.96½c.; Galvanized Sheets, Nos. 10 to 14, 2.71½c.; Nos. 15 and 16, 2.91½c.; Nos. 17 to 21, 3.06½c.; Nos. 22 to 24, 3.21½c.; Nos. 25 to 26, 3.41½c.; No. 27, 3.61½c.; No. 28, 3.81½c.; No. 30, 4.31½c. Sheets from store, Blue Annealed, No. 12, 2.25c.; No. 14, 2.30c.; No. 16, 2.40c.; Box Annealed, Nos. 18 to 21, 2.70c.; Nos. 22 to 24, 2.75c.; No. 26, 2.80c.; No. 27, 2.85c.; No. 28, 2.95c.; No. 30, 3.35c.; Galvanized from store, Nos. 10 to 20, 3.20c. to 3.25c.; Nos. 22 to 24, 3.45c. to 3.50c.; No. 26, 3.55c. to 3.60c.; No. 27, 3.65c. to 3.85c.; No. 28, 4c.; No. 30, 4.55c. to 4.60c.

**Merchant Steel.**—Owing to the inability of the mills to make prompt deliveries sales from store have improved materially. Although the mills are booking little new tonnage, specifications on existing contracts still exceed production. We quote: Planished or Smooth Finished Tire Steel, 1.96½c.; Iron Finish, up to 1½ x ½ in., 1.91½c.; Iron Finish, 1½ x ½ in. and larger, 1.76½c., base; Channels for solid rubber Tires, ¾ to 1 in., 2.26½c., and 1½-in. and larger, 2.16½c.; Smooth Finished Machinery Steel, 2.01½c.; Flat Sleigh Shoe, 1.71½c.; Concave and Convex Sleigh Shoe, 2.06½c.; Cutter Shoe, 2.35c.; Toe Calk Steel, 2.31½c.; Railway Spring, 1.96½c.; Crucible Tool Steel, 6½c. to 8c., and still higher prices are asked on special grades. Shafting, 50 per cent. off in car lots and 45 per cent. in less than car lots, in base territory.

**Merchant Pipe.**—The inclement weather which prevails throughout the West and Northwest has not resulted in any appreciable decline in consumption, and the insistent demands for prompt shipments are indicative of low stocks. Discounts on car lots, Chicago, are as follows: Black Steel Pipe, 76.35 on the base sizes, ¾ to 6 in., and Galvanized, 66.35. From store in small lots Chicago jobbers quote 73½ to 74 per cent. on Black Steel Pipe, ¾ to 6 in. Iron Pipe is held at an advance of 4 to 5 points above these prices.

**Boiler Tubes.**—That no advance on Tubes has followed the recent announcement of higher prices on Pipe has caused some surprise in the trade, especially in view of the high prices ruling for Skelp. Mill quotations are as follows on base sizes, 2¾ to 5 in., in carload lots: Steel Tubes, 68.35; Iron, 55.35; Seamless, 50.35; 2½-in. and smaller and lengths over 18 ft., and 2½-in. and lengths over 22 ft., 10 per cent. extra. Store prices are unchanged, as follows:

	Steel.	Iron.	Seamless.
1 to 1 1/4 in.....	40	35	42 1/2
1 1/4 to 2 1/4 in.....	50	35	35
2 1/4 to 3 in.....	52 1/2	35	30
3 to 5 in.....	60	47 1/2	42 1/2
6 in. and larger.....	50	35	..

**Cast Iron Pipe.**—The city of Minneapolis is in the market for 2000 tons of Pipe for 1907 delivery, and the local gas company at that place is asking for prices on 500 tons. We quote: Water Pipe, 4 in., \$37 to \$38; 6, 8, 10 and 12 in., \$36 to \$37; over 12 in., \$35 to \$36, with \$1 extra for Gas Pipe.

**Coke.**—Conditions in the Coke trade show no improvement, the car shortage still delaying shipments from the Connellsville and Virginia fields. The output of the local and Milwaukee By-product plants has been sold through the first half of next year, and little is available for spot shipment. We quote: By-product and Connellsville grades at \$6.65 to \$7, and Virginia at \$6.25 to \$6.50, f.o.b. Chicago.

**Old Material.**—The demand for Old Wheels is almost insatiable and prices continue to move upward. Sales have been made at \$26, and some dealers are asking as high as \$26.50. Mill grades show a weakening tendency, owing to the refusal of large consumers to buy freely for future requirements; prices none the less are unchanged. The increased consumption of Cast Scrap, due to the Pig metal shortage, has resulted in higher prices on that grade, and the Malleables are also firm but unchanged. Railroad sales negotiated last week were all on a high basis, Car Springs and Locomotive Tires having brought about higher values. We revise quotations on gross tons, car lots, f.o.b. Chicago, as follows:

Old Iron Rails.....	\$28.00 to \$29.00
Old Steel Rails, 4 ft. and over.....	21.50 to 22.00
Old Steel Rails, less than 4 ft.....	20.50 to 21.00
Heavy Relaying Rails, subject to inspection, 50 lb. and under.....	31.00 to 32.00
Old Car Wheels.....	25.25 to 26.00
Heavy Melting Steel Scrap.....	17.50 to 18.00
Frogs, Switches and Guards.....	18.00 to 18.50
Mixed Steel.....	15.00 to 15.50

The following quotations are per net ton:

Iron Fish Plates.....	\$23.00 to \$23.50
Iron Car Axles.....	27.50 to 28.00
Steel Car Axles.....	23.50 to 24.00
No. 1 Railroad Wrought.....	17.50 to 18.00
No. 2 Railroad Wrought.....	16.50 to 17.00
Railway Springs.....	17.00 to 17.50
Locomotive Tires, smooth.....	17.00 to 17.50
No. 1 Dealers' Forge.....	13.50 to 14.00
Mixed Bushing.....	12.50 to 13.50
Iron Axle Turnings.....	11.00 to 11.50
Soft Steel Axle Turnings.....	11.00 to 11.50
Machine Shop Turnings.....	11.00 to 11.50
Mixed Borings.....	9.00 to 9.50
No. 1 Mill.....	9.00 to 9.50
No. 2 Mill.....	10.50 to 11.00
No. 1 Rollers, cut to Sheets and Rings.....	9.50 to 10.00
No. 1 Cast Scrap.....	12.50 to 13.00
Stove Plate and Light Cast Scrap.....	18.00 to 18.50
Railroad Malleable.....	14.00 to 14.50
Agricultural Malleable.....	18.00 to 18.50
	17.00 to 17.50

The Chicago sales office of the Bethlehem Steel Company has been removed to the Fisher Building. H. A. Jackson is resident sales agent.

## Philadelphia.

PHILADELPHIA, PA., December 18, 1906.

The week has been marked by continued activity in the Pig Iron market, upward of 50,000 tons of Basic having been taken for delivery the third quarter of next year. There is little or nothing doing for the first half, as everything available appears to be under contract, but buyers seem to be so confident in regard to their future requirements that they are taking large lots for the last half of the year. Foundry grades are strong for delivery the third and fourth quarters of the year. There is also marked activity in Finished Material, prices of which have scored further advances. At this season there is usually more or less of a slackening down, but up to this date the tendency has been toward increasing activity, as well as higher prices. It is still expected that before the end of the year there will be some slowing down, as there is hardly anything that can be bought for early delivery, so that buyers feel that they cannot gain much and may not lose anything by waiting until after the holidays, by which time it is expected that the outlook will be more distinct than it is at the present time. The situation is without precedent, however, so that experience goes for very little, and about all that can be done is to go with the stream. At the high prices now prevailing and the extraordinary amount of business which is under way there is quite a possibility that in some lines prices may have reached their extreme limits, especially as regards raw materials. Foundry Pig at \$25 a ton seems to be very high, yet the scarcity is world wide, and consumption is so heavy that after all high prices may not necessarily indicate, as they have in former years, any immediate sign of breakers ahead. It is now more than a quarter of a century since

we had such high figures on Foundry Iron as are now ruling, but against that we must place the fact that during the high priced years the yearly output was not more than 15 per cent. of what it is to-day, so that \$25 for Pig Iron to-day with a consumption at the rate of 25,000,000 tons a year is something different from \$25 Pig Iron with a production of only 4,000,000 tons a year; yet these figures, extraordinary as they may appear to be, are in exact accordance with facts. At this time, therefore, it is impossible to say whether prices are going higher or whether a slight reaction is pending, although it is expected that in the course of five or six weeks from now the situation will be sufficiently clear to enable fairly correct opinions to be formed in regard to this matter. For the present, however, prices are at the highest, not only for this year but for any year since 1880, while the output is more than sixfold what it was the year named.

**Pig Iron.**—The movement in Pig Iron has been unusually active the past few days, and in view of pending holidays it is surprising that buying should be as active as it is. Upward of 50,000 tons of Basic have been taken, and a very large amount of Foundry Iron at prices which a little while ago would have seemed almost incredible. Consumers manifest the greatest confidence in the situation, however, and appear to have no hesitation in buying heavily for the third quarter of the year, and to some extent for the fourth quarter as well. It is difficult to get anything for delivery in the next six months, as everything seems to be taken up, and deliveries are called for with so much urgency that there is but little opportunity of securing any large tonnage at any price. Quotations for this delivery are therefore subject to premiums of 50c. to \$1, and in some cases more than that per ton where the case is very urgent. The increase in the output, which was shown by last week's furnace report, is somewhat reassuring, but the scarcity is hardly less severe than it has been at any time the past several months, and consumers have some doubt whether the furnaces will be able to make their deliveries as agreed upon. Foreign Iron has been a great relief, and will probably continue so until well into January or February. There are two steamers in the Delaware River carrying about 9000 tons, and a third is due with 5000 more, but everything is sold to arrive except probably about 1000 tons on a steamer which is not yet reported. Prices for Middlesbrough No. 3 command from \$22.50 to \$23, on dock, and Scotch \$24.50 to \$25. Middlesbrough No. 1 is now pretty well exhausted, so that quotations of this grade will be omitted from this time forward. The quotations given below are for deliveries in eastern Pennsylvania and adjoining territory during the last half of 1907, although the third quarter brings a little more than is paid for the fourth quarter, the range being about as follows:

No. 1 X Foundry.....	\$26.00 to \$26.50
No. 2 X Foundry.....	23.50 to 24.25
No. 2 Plain.....	23.00 to 23.50
Standard Gray Forge.....	22.00 to 22.50
Basic.....	22.50 to 23.00
Low Phosphorus.....	27.25 to 27.75
Malleable.....	25.50 to 26.50
Middlesbrough No. 3, on dock.....	22.50 to 23.00
Scotch, on dock.....	24.50 to 25.00

**Ferrolloys.**—Business has been very quiet the past few days, although prices are firm at last week's figures, which would be about \$80 to \$82 seaboard for the first quarter, and \$77 to \$79 for later dates. Ferrosilicon is still scarce, but 10 per cent. is quoted at about \$32, and in the absence of the higher grade this article is somewhat more active than usual.

**Steel.**—The urgency in demand continues, and although the output is large and increasing, it is difficult to get prompt shipments. Prices are a little higher and may be quoted \$34 to \$35 for Ordinary Rolling Billets and \$38 to \$40 for Forging Billets.

**Plates.**—Business has been extremely active, as buyers have been expecting an advance in prices, which is now being realized. The amount of work on the books is extremely heavy, however, and it will be difficult to do much beyond taking care of the business already entered. Nevertheless, prices for spring and summer deliveries are about a tenth dearer, and when deliveries can be made for earlier dates they also command extra price, as follows:

	Carload. Cents.	Part carload. Cents.
Tank, Bridge and Boat Steel.....	2.03 1/4	2.08 1/4
Flange or Boiler Steel.....	2.13 1/2	2.18 1/2
Marine.....	2.43 1/2	2.48 1/2
Locomotive Firebox Steel.....	2.53 1/2	2.58 1/2
The above are base prices for 1/4-in. and heavier. The following extras apply:		
3-16 in. thick.....		\$0.10
Nos. 7 and 8, B. W. G.....		.15
No. 9, B. W. G.....		.25
Plates over 100 to 110 in.....		.05
Plates over 110 to 115 in.....		.10
Plates over 115 to 120 in.....		.15
Plates over 120 to 125 in.....		.25
Plates over 125 to 130 in.....		.50
Plates over 130 in.....		1.00

**Structural Material.**—There is nothing out of the usual routine to report in this department of the Steel trade, although buyers are rather disposed to expect higher prices in the near future. Some business is being placed in anticipation of this, but in the meanwhile quotations are made as

before—namely, Beams, Channels and Angles, 1.83½c. to 2c., according to specifications.

**Bars.**—The demand is very heavy and prices are at least half a tenth higher than they were a week ago. There are few if any mills that will quote less than 1.83½c. for Best Refined Iron, and most mills ask 1.88½c. to 1.93½c., which appears to be freely paid for first-class Iron. Steel Bars are nominal at a lower figure, but for reasonably prompt shipments quotations are almost on a parity with Best Iron Bars, as we have already quoted.

**Sheets.**—A further advance has been made in the price of Sheets, so as to offset in some measure the higher cost of production. The demand is very good, prices being as follows for mill shipments and a tenth additional for smaller quantities, namely: Nos. 18 to 20, 2.80c.; Nos. 22 to 24, 2.90c.; Nos. 25 to 26, 3c.; No. 27, 3.10c., and No. 28, 3.20c.

**Old Material.**—The market is very strong, but as the offerings are small the amount of business done is not of any great importance, and quotations are nominally about the same as last week, although holders are inclined to ask more money, especially for Steel. Bids and offers for material delivered in buyers' yards are about as follows:

Steel Crops.....	\$20.00 to \$20.50
No. 1 Steel Scrap.....	19.50 to 20.00
Low Phosphorus.....	24.00 to 24.50
Old Steel Axles.....	24.50 to 25.00
Old Iron Axles.....	32.00 to 32.50
Old Iron Rails.....	27.75 to 28.25
Old Car Wheels.....	23.00 to 23.50
Choice No. 1 R. R. Wrought.....	23.25 to 23.75
No. 1 Yard Scrap.....	21.50 to 22.00
Long and Short.....	19.50 to 20.00
Machinery Scrap.....	21.50 to 22.00
Wrought Iron Pipe.....	17.25 to 17.50
No. 1 Forge Fire.....	17.00 to 17.50
No. 2 Light.....	12.00 to 12.50
Wrought Turnings.....	16.00 to 16.50
Axle Turnings.....	17.00 to 17.50
Stove Plate.....	17.00 to 17.50
Cast Borings.....	13.00 to 13.50
Grate Bars.....	15.50 to 16.00

## Pittsburgh.

PARK BUILDING, December 19, 1906.—(By Telegraph.)

**Pig Iron.**—Buying is almost completely confined to small lots, and there is only a fair amount of inquiry. Sales are noted of 6000 to 8000 tons of Malleable Bessemer and Standard Bessemer Iron for first quarter delivery on the basis of \$22, Valley furnace, for the Malleable and \$23, at furnace, for the Standard Bessemer. Small lots of Bessemer for prompt shipment have sold at slightly above \$24, Valley furnace. These, however, are emergency sales, and do not represent the legitimate market on Bessemer, which we continue to quote at \$22.50, Valley furnace. Small lots of Northern No. 2 Foundry for prompt delivery have sold at \$25, Valley furnace, but for delivery through first quarter Northern No. 2 Foundry can be had at \$23 to \$23.50, Valley furnace. There is some inquiry for Forge Iron for first quarter delivery, and it is held at \$22, Valley furnace, or \$22.85, Pittsburgh.

**Steel.**—We note a sale of 1000 tons of 4 x 4 in. Open Hearth Billets for January and February delivery at \$33, Pittsburgh. We quote Bessemer Billets at \$29.50 to \$30 and Open Hearth at \$32.50 to \$33, Pittsburgh. We quote Sheet and Tin Bars in random lengths at \$29.50 to \$30, Pittsburgh.

(By Mail.)

We are now close to the end of the year, and, as usual at this season, conditions in the Iron trade have quieted down somewhat. While inquiries are not as numerous as they have been, the market is strong in every direction, and there are no signs of any recessions in prices. At the same time it is believed that the top of the market has possibly been reached in Pig Iron and Steel, and probably also in Finished Iron and Steel, with the exception of Sheets, Tin Plate and Light Rails, on which an early advance in prices is looked for by the trade. Sales of Pig Iron and Steel the past week, while light in volume, have been at top prices, small lots of Bessemer Iron for prompt shipment having brought about \$24, at furnace, while 4 x 4 in. Open Hearth Billets have sold at \$33, Pittsburgh. The tonnage of new business in Finished Iron and Steel being placed with the mills is not as heavy as it was, but specifications on contracts are being received in large volume and deliveries on practically all kinds of material are anywhere from three weeks to four months behind. The demand for Light Rails is usually active.

**Ferromanganese.**—Practically all the leading consumers of Ferro are covered either for first half or for the whole of next year, but there is a moderate demand and prices are firm. For delivery in first half foreign 80 per cent. Ferro is held at about \$80, while for prompt shipment about \$85 is quoted.

**Wire Rods.**—Bessemer and Open Hearth Rods are bringing any prices that sellers care to ask, it being almost impossible to get Rods for prompt delivery. We quote \$37 for Bessemer Rods and \$38 for Open Hearth, f.o.b. Pittsburgh, but sellers who could make prompt deliveries would no doubt be able to get higher prices.

**Muck Bar.**—While the demand has quieted down to some extent, mills that have any Bars to spare and can make reasonably prompt deliveries can get high prices for it. We quote best grades made from all Pig Iron at \$36 to \$37, while Bar made from part Scrap is held at about \$33 to \$34, Pittsburgh.

**Skelp.**—Mills rolling Skelp are filled with contracts for two or three months, and it is very difficult to get prompt delivery. Prices are high and very firm. We quote: Grooved Steel Skelp, 1.65c. to 1.70c.; Sheared Steel Skelp, 1.70c. to 1.75c.; Grooved Iron Skelp, 1.75c. to 1.80c.; Sheared Iron Skelp, 1.85c. to 1.90c., Pittsburgh, these prices depending on widths and gauges.

**Steel Rails.**—During the week the Carnegie Steel Company entered orders for about 30,000 tons of Standard Sections, and we note a sale of 30,000 tons made by an Eastern mill to a Southern road. The demand for Light Rails continues active, and so far this year the Carnegie Company has entered orders for over 100,000 tons. It is probable that another advance in Light Rails will be made shortly after January 1. We quote: \$32 for 20 to 45-lb.; \$33 for 16-lb., and \$34 for 12-lb., at mill. Angle Splice Bars are held at 1.65c., and Standard Section Rails at \$28, at mill.

**Structural Material.**—Contracts taken during the week include an extension to the open hearth building of the La Belle Iron Works at Steubenville, Ohio, about 500 tons, and a new building for the John A. Roebling's Sons Company at Kinkora, N. J., 500 tons, both taken by the McClintic-Marshall Construction Company. General conditions in the Structural trade are quieter than they have been, but there is a fair amount of inquiry, mostly for small work. Some large jobs are being figured on, but it is not expected that these will be given out until after the first of the year. The market is very firm, and we quote: Beams and Channels, up to 15-in., 1.70c.; over 15-in., 1.80c.; Angles, 3 x 2 x ¼ in. thick up to 6 x 6 in., 1.70c.; 8 x 8 and 7 x 3½ in., 1.80c.; Zees, 3-in. and larger, 1.70c.; Tees, 3-in. and larger, 1.75c. Under the Steel Bar card, Angles, Channels and Tees under 3-in. are 1.60c., base, for Bessemer and Open Hearth, subject to half extras on the Standard Steel Bar card.

**Plates.**—The market on Plates is now firmly established on the basis of 1.70c., Pittsburgh, but the very large consumers, such as the Steel car builders, the lake boat interests and others, are covered by contracts which are not affected by the advances in prices. The demand continues heavy and specifications are being received by the mills in large volume. The Plate mills will enter the new year with more unfilled tonnage on their books than ever before in their history. Some of the smaller mills can make deliveries in three or four weeks on the usual run of orders, but the large mills are from six weeks to three months behind. We quote: Tank Plates, ¼ in. thick, 6¼ in. up to 100 in. in width, 1.70c., base, at mills, Pittsburgh. Extras over this price are as follows:

	Extra per 100 lb.
Gauges lighter than ¼ in. to and including 3-16 in.	
Plates on thin edges.....	\$0.10
Gauges Nos. 7 and 8.....	.15
Gauge No. 9.....	.25
Plates over 100 to 110 in.....	.05
Plates over 110 to 115 in.....	.05
Plates over 115 to 120 in.....	.15
Plates over 120 to 125 in.....	.25
Plates over 125 to 130 in.....	.50
Plates over 130 in.....	1.00
All sketches (excepting straight taper Plates varying not more than 4 in. in width at ends, narrowest end being not less than 30 in.).....	.10
Complete Circles.....	.20
Boiler and Flange Steel Plates.....	.10
"A. B. M. A." and ordinary Firebox Steel Plates.....	.20
Still Bottom Steel.....	.30
Marine Steel.....	.40
Shell Grade of Steel is abandoned.	

**TERMS.**—Net cash 30 days. For anticipated payments a maximum discount may be allowed at the rate of 6 per cent. per annum and for a longer time than 30 days interest shall be charged at the same rate per annum. Invoices paid within 10 days from date thereof, discount of ¼ of 1 per cent. is allowable. Pacific Coast base, 1.60c., f.o.b. Pittsburgh, with all rail tariff rate of freight to destination added, no reduction for rectangular shapes 14 in. wide down to 6 in. of Tank, Ship or Bridge quality.

**Sheets.**—Some mills report that on the heavier gauges of Sheets they are able to obtain \$1 a ton premium over the official prices, and the enormous tonnage on their books, together with the fact that Sheet Bars continue scarce and bring upward of \$30, leads the trade to believe that an early advance in prices is not improbable. The fact is

pointed out that for the last two years there has not been much increase in the capacity for making Sheets, while, on the other hand, the consumption has steadily increased, and Sheets are now being used for purposes for which other materials were used two or three years ago. It would strongly seem that the consumption of Sheets for some time will be heavier than the output, and for this reason the mills expect to be kept very busy for the first half of the new year, if not for the entire year. Some new Sheet mills are to be built by the American Sheet & Tin Plate Company, while some of the independent mills are also considering the matter of increasing their capacity. Prices are very firm and we quote: Blue Annealed Sheets, No. 10 gauge and heavier, 1.80c.; Nos. 11 and 12, 1.85c.; Nos. 13 and 14, 1.90c.; Nos. 15 and 16, 2c.; Box Annealed, Nos. 17 to 21, 2.35c.; Nos. 22 to 24, 2.40c.; Nos. 25 and 26, 2.45c.; No. 27, 2.50c.; No. 28, 2.60c.; No. 29, 2.75c.; No. 30, 2.85c. We quote Galvanized Sheets as follows: Nos. 10 and 11, 2.55c.; Nos. 12 and 14, 2.65c.; Nos. 15 and 16, 2.75c.; Nos. 17 to 21, 2.90c.; Nos. 22 and 24, 3.05c.; Nos. 25 and 26, 3.25c.; No. 27, 3.45c.; No. 28, 3.65c.; No. 29, 3.90c., and No. 30, 4.15c. We quote No. 28 Gauge Painted Roofing Sheets at \$1.85 per square, and Galvanized Roofing Sheets, No. 28 gauge, \$3.15 per square for 2-in. corrugations. These prices are for carload lots, jobbers' charging the usual advances for small lots from store.

**Hoops and Bands.**—Practically all the business in Hoops and Bands has been placed for nearly a year, and there will be little new buying for some time. Specifications on contracts continue to come in freely and shipments by the mills are heavy. Prices are firm, and we quote: Steel Hoops, 2c., and Bands for all purposes at 1.60c., base, half extras, as per Standard Steel card. These prices are for carload lots, f.o.b. Pittsburgh, plus full tariff rail rate to point of delivery, an advance of \$2 a ton being charged for less than carloads.

**Tin Plate.**—The mills are running nearly altogether on specifications on contracts, some of which call for deliveries into the third quarter of 1907, but the amount of new business being placed is relatively small. The trade still expects an early advance in prices on Tin Plate of at least 10 cents per base box. We quote \$3.90 per base box, f.o.b. Pittsburgh, for 14 x 20 100-lb. Cokes, terms 30 days, less 2 per cent. off for cash in 10 days, on which price a rebate of 5c. a box is allowed for carload and larger lots.

**Railroad Spikes.**—We note a continued active demand, the railroads placing heavy orders, but on the larger sizes the mills are making better deliveries than some time ago. On the smaller sizes they are still from six to eight weeks, and in some cases as long as three months, behind in shipments. Prices are very firm, and we quote Railroad Spikes at \$2.40 to \$2.50 per 100 lb. on contracts for future delivery, while \$2.65 to \$2.75 is quoted on orders for reasonably prompt delivery.

**Merchant Steel.**—Specifications on contracts from implement makers and other consumers are unusually heavy and tax the capacity of the mills to the utmost in making shipments. New business being placed with the mills is for small lots only, the larger trade having covered by contracts some months ago. Prices are firm, as follows: Smooth Finished Merchant Steel, 1.85c.; Flat Sleigh Shoe, 1.50c. to 1.55c.; Cutter Shoe, 2.15c. to 2.20c.; Railroad Spring Steel, 1.75c. to 1.80c.; Toe Calk Steel, 2.10c. to 2.15c.; Crucible Tool Steel, 6c. to 8c. and upward, depending on quality. The demand for Shafting is fairly active, the mills being somewhat behind in deliveries. We quote Cold Rolled Shafting at 50 per cent. off in carloads and 45 per cent. in less than carloads, delivered in base territory.

**Iron and Steel Bars.**—Some large contracts for Iron Bars from Western railroads have recently been placed, most of this tonnage going to mills west of Pittsburgh. The new demand for both Iron and Steel Bars is active, and the mills are not catching up on deliveries to any great extent. The local makers of Iron Bars continue to quote 1.80c. to 1.85c. Pittsburgh, but for delivery at certain competitive points slightly lower prices are made. We also note that some Eastern mills are offering Iron Bars for delivery in the Pittsburgh District at slightly less than 1.80c. delivery. The market on Steel Bars is very firm, and we quote at 1.60c. to 1.65c., base, half extras, f.o.b. Pittsburgh.

**Spelter.**—The demand has increased rapidly in the last few weeks, some of the Western smelters having their entire product sold as far ahead as March. Prime grades of Western are now held at about 6.45c., St. Louis, equal to 6.57½c., Pittsburgh.

**Pipes and Tubes.**—No further contracts for the larger sizes of Pipe used in gas and oil lines have been placed since those noted in this report last week. A heavy tonnage in the larger sizes is in sight, and some of this business will undoubtedly be placed early in the new year. There never has been a period in the Pipe trade when the mills had so much tonnage on their books as they have at the present time, and all are much behind in deliveries. The tonnage in Pipe entered by the leading interest in November, and by the larger outside mills, compared very favorably with October,

but was not quite as heavy. The extreme discount on Merchant sizes of Steel Pipe is 78 and 5 per cent. off to the large trade. The official discounts, which are shaded one point or more to the large trade, are as follows:

	Merchant Pipe.			
	Jobbers, carloads.		Iron.	
	Black.	Galv.	Black.	Galv.
1/8 and 1/4 in.	69	53	65.5	49.5
3/8 in.	71	57	65.5	57.5
1/2 in.	73	61	73.5	63.5
3/4 to 6 in.	77	67	73.5	63.5
7 to 12 in.	72	57	69	54
Extra strong, plain ends:				
1/8 to 1/4 in.	62	50	58.5	46.5
1/2 to 4 in.	69	57	65.5	53.5
4 1/2 to 8 in.	65	53	61.5	48.5
Double extra strong, plain ends:				
1/2 to 8 in.	58	47	53.5	42.5

**Boiler Tubes.**—A fair amount of new tonnage is being placed in both Locomotive and Merchant Tubes, but a great many of the large consumers have covered their requirements well into next year. The recent advances of \$4 and \$2 a ton in Pipe led some in the trade to believe that prices on Boiler Tubes may also be advanced before long. The market is firm, official discounts being as follows:

	Boiler Tubes.	
	Iron.	Steel.
1 to 1 1/4 in.	45	50
1 1/4 to 2 1/4 in.	45	62
2 1/2 in.	50	64
2 3/4 to 5 in.	57	70
6 to 13 in.	45	62

**Iron and Steel Scrap.**—The demand for Scrap has quieted to some extent, probably due to the fact that we are now close to the end of the year, when the mills do not care to take in any more material than is absolutely necessary. The market is firm, but it is the general opinion that prices on Scrap, like other material, are probably as high as they will go, for some little time at least. Dealers quote about as follows: Heavy Steel Melting Scrap, \$20, for Pittsburgh or Sharon delivery; No. 1 Wrought Scrap, \$21 to \$21.50; No. 2 Wrought Scrap, \$19 to \$19.50; Old Steel Rails, short pieces, 6 ft. and under, for Open Hearth purposes, \$20; Old Steel Rails, rerollers, \$22.50; Wrought Turnings, \$15.50 to \$15.75; Low Phosphorus Melting Stock, \$25; Bundled Sheet Scrap, \$17.25 to \$17.50; Cast Iron Borings are \$13 to \$13.25; Old Car Wheels, \$25; Steel Axles, \$24; No. 1 Cast Scrap, \$20; Railroad Malleable, \$19 to \$19.50; Cast Iron Borings, \$12.75 to \$13; Iron Axles, \$32 to \$33; Stove Plate, \$16 to \$16.50, and Grate Bars, \$15.50. All prices are per gross ton, f.o.b. Pittsburgh, unless otherwise specified.

**Coke.**—While the large consumers of Coke, which are the blast furnaces and foundries, are pretty well covered for the first half of the year and in some cases through all of next year, there is a fair demand for Furnace and Foundry Coke for prompt shipment. We note that strictly Connellsville Furnace Coke for prompt delivery has sold as high as \$3.60 a ton at oven. Connellsville 72-hr. Foundry Coke for prompt delivery has sold at high as \$4.25 at oven. Car service in the region is good, and promises to continue so unless severe weather should set in, with deep snows, which always retards the movement of cars. Labor is somewhat scarce in some parts of the region, which is holding back work on new ovens, as well as restricting the output of Coke at some of the principal plants. We quote strictly Connellsville Furnace Coke for prompt delivery at \$3.40 to \$3.60, and 72-hr. Foundry at \$4 to \$4.25 at oven. On contracts for first half of the year delivery, Connellsville Furnace Coke is held at \$3 to \$3.25 and 72-hr. Foundry at \$3.75 to \$4 a ton at oven. The output of Coke continues enormously heavy, the Upper and Lower Connellsville regions having made last week 407,091 tons.

Edward B. Yellig is now connected with the L. A. Green Company, dealer in Rails, Railroad Supplies and Iron and Steel Scrap, with offices in the Keystone Bank Building, Pittsburgh, Pa.

## Cincinnati.

FIFTH AND MAIN STS., December 19, 1906.—(By Telegraph.)

**Pig Iron.**—A stronger feeling exists as regards the future, which is evidenced by the continued buying for deliveries covering the first half of next year. The car situation, especially in the South, is very bad, railroads being unable to move much Iron, awaiting the necessary equipment for shipment, and therefore Iron is piling up at the furnaces. They are, of course, anxious to unload this accumulation, which is alike hampering both producer and consumer. It is expected that production will be considerably curtailed the next two or three weeks, owing to the holiday season. Southern prices are practically unchanged, prompt delivery of No. 2 Foundry being quotable from \$22 to \$23, Birmingham; \$22 to \$22.50 for first quarter, \$19 to \$19.50, second quarter, and \$18 to \$19 for last half. There appears to be a fair demand for Gray Forge for delivery into next year, with prompt offerings quiet. High Silicon Irons con-

tinue in heavy demand and are very scarce. The inquiry for Malleable and Basic is strong, with available tonnage limited. The Northern situation is virtually unchanged, with prices about as last reported. One large consumer is said to be in the market for an indefinite tonnage for last half, with numerous 500-ton inquiries from various sections. Freight rates from Hanging Rock District to Cincinnati are \$1.15, and from Birmingham \$3. We quote, f.o.b. Cincinnati, as follows:

Southern Coke, No. 1.....	\$26.00 to \$27.00
Southern Coke, No. 2.....	25.00 to 26.00
Southern Coke, No. 3.....	24.00 to 25.00
Southern Coke, No. 4.....	23.00 to 24.00
Southern Coke, No. 1 Soft.....	26.00 to 27.00
Southern Coke, No. 2 Soft.....	25.00 to 26.00
Southern Coke, Gray Forge.....	22.00 to 23.00
Southern Coke, Mottled.....	21.00 to 22.00
Ohio Silvery, 8 per cent.....	29.15 to 29.65
Lake Superior Coke, No. 1.....	25.65 to 26.65
Lake Superior Coke, No. 2.....	25.15 to 26.15
Lake Superior Coke, No. 3.....	24.65 to 25.65

#### Car Wheel Irons.

Standard Southern Car Wheel.....	\$28.50 to \$29.00
Lake Superior Car Wheel.....	27.00 to 27.50

**Coke.**—The market is strong, but possibly a little easier. The demand for Furnace brands is said to be more urgent than for the Foundry grades. Spot Furnace is quotable at \$3.50 to \$3.90 and contract \$3.25 f.o.b. ovens, with the best brands of Foundry bringing from \$4.25 to \$4.50 ovens, Connellsville or Virginia regions.

**Finished Iron and Steel.**—The market is very active and considerable business is being booked for the last half. One large interest has advanced the price on Heavy Rails, making the base price \$30, Pittsburgh. We quote, f.o.b. Cincinnati, as follows: Iron Bars, in carload lots, 1.93c., with half extras; the same, in smaller lots, 2.10c., with full extras; Steel Bars, in carload lots, 1.73c., with half extras; the same, in smaller lots, 1.95c., with full extras; Base Angles, 1.83c., in carload lots; Beams and Channels, in carload lots, 1.83c.; Plates, 1/4-in. and heavier, 1.83c., in carload lots; in smaller lots, 2c.; Sheets, 16 gauge, in carload lots, 2.15c.; in smaller lots, 2.70c.; 14 gauge, in carload lots, 2.05c.; in smaller lots, 2.60c.; Steel Tire, 1 x 1/4 in. or heavier, 1.93c., in carload lots.

**Old Material.**—The demand continues exceedingly heavy. We quote dealers' prices, f.o.b. Cincinnati, as follows:

No. 1 Railroad Wrought, net ton.....	\$17.50 to \$18.00
Cast Borings, net ton.....	9.25 to 9.50
Steel Turnings, net ton.....	11.50 to 12.50
No. 1 Cast Scrap, net ton.....	16.50 to 17.50
Old Iron Axles, net ton.....	26.50 to 27.50
Old Iron Rails, gross ton.....	26.75 to 27.25
Old Steel Rails, long, gross ton.....	19.00 to 20.00
Relaying Rails, 56 lb. and up, gross ton.....	28.50 to 29.50
Old Car Wheels, gross ton.....	22.50 to 23.00
Low Phosphorus Scrap, gross ton.....	21.00 to 21.50

The twenty-sixth anniversary of the firm of Rogers, Brown & Co. is being held in Cincinnati this week. Branch managers to the number of 40 are present.

## Birmingham.

BIRMINGHAM, ALA., December 16, 1906.

**Pig Iron.**—Inquiry for the third quarter of 1907 is more in evidence, and sales aggregating several thousand tons have been made this week at prices ranging from \$18 to \$18.50 on a No. 2 Foundry basis. For the second quarter there remains but little Soft Iron on the market, and one of the largest producers has instructed its agents only to book orders for Nos. 1 and 2 when coupled with Nos. 3 or 4 Foundry. Some spot Iron is still obtainable, but the furnaces shipping this are doing so at the expense of their regular customers. Every effort is being made to accumulate sufficient stocks of raw material at the furnaces to enable them to operate during the holidays, but labor conditions and scarcity of Coal and Ore cars are handicapping them to such an extent that it is probable several stacks will have to be temporarily banked. The car situation is growing worse all the time, and has reached a point where several foundries in the district have been forced to dray their Iron to prevent closing down. One of the large Pipe manufacturers has been using its own engines and cars for hauling its Pig Iron for some weeks. Probably the limit was reached this week when one of the railroads out of New Orleans ran short on Coal and sent a train of Coal cars, pulled by one of its own engines and in charge of its own men, here for a supply of Coal. By special arrangement with the mines these cars were placed under the tipples immediately upon arrival, and within a few hours were loaded and en route home. The flat cars of a large circus wintering here have been pressed into service for hauling cotton, and are daily making trips from the compresses to the stations along the line of road. Requests for trace shipments of Iron have become so urgent that some of the furnace people started a little investigation on their own account and located several hundred cars of Iron in railroad yards a few miles out, a large percentage of which was shipped from 40 to 60 days ago. When this Iron will ever

reach destination is a problem, as the roads here are now refusing to accept business routed north of the Ohio River, giving as a reason that many of the roads in that section are already congested, and that they must have the privilege of delivering it to any connection which may be in condition to handle it to best advantage.

**Cast Iron Pipe.**—The troubles of Pipe manufacturers are greater than ever before in the history of the business. Added to the labor situation, which is appalling, the question of a supply of raw material and the scarcity of cars in which to load the product are such as to keep them at all times on the ragged edge. Several of the foundries in the district are located within a stone's throw of the furnaces, but, struggle as they may, they are unable to get more than their daily requirements of Iron delivered and are unable to accumulate any stock whatever. It is just the opposite with regard to the Pipe, and despite the most strenuous efforts of the manufacturers stocks are accumulating on their yards to such an extent that it will soon be a problem where to store the Pipe. One foundry reports more than 200 cars now on hand, and others are in almost as bad fix. Prices for next year's delivery continue strong and are approximately as follows on Water Pipe, f.o.b. cars here: 4 to 6 in., \$34; 8 to 12 in., \$33; over 12 in., \$30, with \$1 per ton extra for Gas Pipe.

**Old Material.**—The market continues firm, with prices about the same as for the past few weeks. Efforts by the mills to stock up have met with poor success, the dealers being unable to supply more than is required for current consumption. Quotations are about as follows per gross ton, f.o.b. cars in dealers' yards here:

Old Iron Rails.....	\$21.50 to \$22.00
Old Iron Axles.....	19.00 to 19.50
Old Steel Axles.....	17.00 to 18.00
Old Car Wheels.....	18.50 to 19.50
No. 1 Railroad Wrought.....	19.00 to 19.50
No. 2 Railroad Wrought.....	15.50 to 16.00
No. 1 Country Wrought.....	15.50 to 16.00
No. 2 Country Wrought.....	12.50 to 13.00
Wrought Pipe and Flues.....	13.00 to 13.50
Railroad Malleable.....	13.00 to 13.50
No. 1 Steel.....	14.00 to 14.50
No. 1 Machinery Cast.....	15.00 to 15.50
Stove Plate and Light Cast.....	11.00 to 11.50
Cast Borings.....	8.00 to 8.50

It is announced that a syndicate headed by J. M. Barr, Norfolk, Va., formerly of the Seaboard Air Line, and J. B. Carrington, Birmingham, has acquired the properties of the Woodstock Iron Works, Anniston, Ala. It is said to be the intention of the purchasers to get the smaller of the two furnaces at Anniston ready for blast at once. H. T. De Bardeleben is mentioned as manager of blast furnaces and Ore mines. Neither of the two Woodstock furnaces at Anniston has been in blast since December, 1903. One stack, 20 x 82 ft., was rebuilt in 1901-1902, and the other, 17 x 75 ft., was rebuilt in 1903. Connected with the furnaces are 374 Coke ovens, and the company has Red and Brown Ore properties, Coal mines and limestone quarries. The Coal mines are at Newcastle, Jefferson County, Ala.

## Cleveland.

CLEVELAND, OHIO, December 18, 1906.

**Iron Ore.**—In the shipping season that has just closed the lake fleet brought 37,513,589 tons of Ore down from the Lake Superior District. This is an increase of 4,036,685 tons over 1905, which had been the banner year of the trade. At the opening of the season the output of Lake Superior mines was estimated at 36,000,000 to 38,000,000 tons. The latter mark would have been reached had not the cold weather in November delayed the movement of Ore and cut off shipments from some mines. The all rail movement, which may be about 750,000 tons, will bring the total shipments for 1906 up to about 38,250,000 tons. As to next season's probable output, some think that as labor and other conditions were so favorable the past season this year's output will not be exceeded next year, and perhaps not for a long time to come. Others who are more sanguine, however, predict that next season will reach 40,000,000 tons. The Ore market has been quiet, as the majority of the mines have sold up to the full limit of the expected capacity. There is considerable Siliceous Ore left on the market, however, and consumers do not yet seem ready to buy. Several large shippers chartered their vessel tonnage for next season the past week. Others are in no hurry to secure charters, as there will be plenty of tonnage for all the Ore next season. All charters have been made at this season's rates. It is believed that all the furnaces have plenty of Ore to last them till spring. Ore quotations are: Old Range Bessemer, \$5; Mesaba Bessemer, \$4.75; Old Range non-Bessemer, \$4.20; Mesaba non-Bessemer, \$4; Bessemer Siliceous, \$2.75.

**Pig Iron.**—The market for the last half of 1907 is stiffening. Many inquiries are being made, and a large number of sales were effected during the week. Inquiries are also being made for delivery for the year beginning in July. It is almost unprecedented for foundrymen to make purchases so

far in advance, and they apparently do not look for lower prices for some time. There is but a small tonnage left for the first and second quarter. Any one who wants Iron for prompt shipment, which means for delivery up to January 1, must pay \$26 to \$28 a ton for it, if it can be found. No. 2 Northern Foundry is quoted at \$22 to \$23, at furnace, for the last half, \$23 being the price for the third quarter. One dealer quotes \$21.50, Valley furnace, last half, and \$22 to \$22.35, delivered in Cleveland. Gray Forge is quoted at \$1 a ton less than No. 2 Foundry. Basic Iron is selling at \$22 to \$23, Valley furnace, for third quarter delivery. No quotations are given for the second quarter. Because of their large sales for the first half, the possibility of higher prices and the talk of higher wages for furnace employees, many furnaces in the Cleveland District are not anxious to make sales for the last half 1907 delivery.

**Coke.**—The Coke market has been very firm the past week. Foundry Coke is quoted at \$4.25, at oven, for the first half and Furnace Coke is selling at \$3.50, at oven. Coke for immediate delivery is sold on the same basis. There is little if any inquiry for Coke for second half 1907 delivery.

**Finished Material.**—Finished Material is firm and scarce. The recent advances have not checked business, and purchasers appear more interested in deliveries than prices. Consumers apparently do not expect to get cheaper material in the first half of 1907, as the output of the mills is pretty well sold. Specifications have been coming in heavily, being unusually large for material for vessels and cars. Many old contracts are being cleaned up and quite a number of new ones have been made for the first half. Forging Billets for immediate delivery are selling at \$38 to \$40, Cleveland, in carloads to 100 tons, but few mills can take orders for spot shipment, and those that have the material can get almost any price. Re-rolling Open Hearth Billets are selling at \$31 to \$32, Pittsburgh, and Bessemer Billets at \$30, Pittsburgh. The demand for Plates is heavy and they are selling on the basis of 1.70c. to 1.80c., Pittsburgh, with mills 30 days behind in deliveries. The mills are not so crowded with orders for Structural Material as for other material, but some Eastern mills are getting premiums, although some mills in this district could fill the orders with reasonable promptness. Sheets and Steel Bars are strong, and some think that Sheets will advance January 1. Steel Bars are quoted at 1.60c., Pittsburgh, and Iron Bars at 1.85c., Pittsburgh. The demand for Light Rails is strong, and an advance is looked for January 1. Sheets are quoted as follows, out of stock: Blue Annealed, No. 10, 2.25c.; No. 28, One Pass Cold Rolled, 2.90c.; No. 28, Galvanized, 3.90c. Steel Bars bring 1.90c. out of stock, and Iron Bars 2c. out of stock.

**Old Material.**—The demand for Old Material has been light and prices are weak. The change in the market is attributed to the close of the year, when purchasers take inventories and allow their stocks to run down. The decline in price on most kinds of Old Material has been from 50c. to 75c. a ton. Turnings and Drillings, however, remain strong. The following are dealers' prices to the trade, f.o.b. Cleveland, per gross ton:

Old Steel Rails.....	\$19.00 to \$19.75
Old Iron Rails.....	26.50 to 27.00
Old Car Axles.....	29.75 to 30.25
Old Car Wheels.....	21.50 to 22.00
Heavy Melting Steel.....	17.50 to 18.00
Cast Borings.....	10.50 to 11.00
No. 1 Bushelling.....	16.50 to 17.00
No. 1 Railroad Wrought.....	19.50 to 20.00
No. 1 Cast.....	20.00 to 20.50
Iron and Steel Turnings and Drillings..	13.25 to 13.75

M. A. Hanna & Co., Cleveland, Ohio, have secured exclusive sale of the output of the Perry Iron Company, now building a blast furnace at Erie, Pa. This furnace is not expected to be ready for operation before July 1.

### The Coal Trade.

BY FREDERICK E. SAWARD.

The closing month of 1906 finds the coal trade in good shape from the producer's standpoint of the tonnage dealt in and the price received for it. The latter point is of interest to consumers, and if one may judge from the reports which come to hand, there is not much chance of a decrease in values, for with the scarcity of transportation facilities the opportunity for such a result is minimized. The tonnage of soft coal will exceed that of last year by about 10 per cent., while hard coal shows a falling off of about the same percentage. But in any event, the total for the United States will exceed 400,000,000 net tons of all grades.

I believe that the so-called inability to fill orders, that one is apt to hear much of in just such times as these, is more than half one of delays of coal in transit during the heavy fall movement of general merchandise. This causes the average consignee so much anxiety that the orders are duplicated, and only with the aid of abnormal weather is the condition continued.

The demand for bituminous coal is copstantly increasing.

Values are rapidly enhancing, and spot coal is increasingly scarce and difficult to obtain. In fact, one might say that, generally speaking, Georges Creek, Pocahontas and New River coals are practically out of the market, as they are all being absorbed on contracts, except here and there a little that some middleman has to dispose of. What little there is selling in this way is bringing fancy prices. At the all rail junction points coal is coming in very slowly indeed, and prices are on the basis of \$1.35 to \$1.50 at the mines for almost any kind of coal.

Some contract customers who feel that they have not been getting a square deal on coal shipments are now being heard from. This may possibly be taken as an index of the situation. Perhaps the climax in car scarcity and slow shipments has now been reached. The complaints from neglected contract customers are usually the last feature of an active market. It is wonderful how many unavoidable circumstances arise to prevent the filling of an unprofitable summer contract, even while coal is going merrily forward on orders placed from day to day at the mines, cash on bill of lading.

The Middle West, served by Pittsburgh and Ohio shippers, finds that the trend of prices is upward, and while quotations are retained at \$2 for 1½-in. screened, \$1.75 for ¾-in. screened, \$1.50 to \$1.60 for run of mine and \$1 for slack, f.o.b. at mines, prompt deliveries are requiring premiums on these prices.

The extent to which fuel tonnage is represented in the total tonnage of the large coal carrying roads for the last fiscal year is shown in the following table:

	Coal tonnage.	Per cent. coal to total.
Baltimore & Ohio.....	28,498,508	51.40
Reading.....	22,344,470	49.99
Erie.....	16,978,032	46.00
Lehigh Valley.....	12,753,053	49.87
Norfolk & Western.....	11,875,300	61.63
Delaware & Hudson.....	9,354,000	51.90
Delaware, Lackawanna & Western.....	9,168,974	52.88
Chesapeake & Ohio.....	9,884,873	60.39

The Pennsylvania Railroad is a large coal carrier actually, but the volume of general traffic makes the coal tonnage somewhat small comparatively.

The list price at the mines, net tons, for prompt delivery, of coal for Middle and Eastern State delivery to what is known as the line trade is as below:

Pennsylvania Railroad coals.	Prompt delivery.
Georges Creek.....	\$1.90 to \$2.00
Best Miller vein.....	1.50 to 1.60
Good Miller and Moshannon.....	1.30 to 1.35
Best gas coal, three-quarter lump.....	1.60 to 1.70
Ordinary Clearfield.....	1.30 to 1.35

Some recent statistics of the bituminous carriers, given below, show how Southern roads are increasing:

	1906. Net tons.	1905. Net tons.
Beech Creek.....	5,947,602	8,255,528
Pennsylvania.....	29,603,054	27,735,655
Broad Top.....	744,975	676,190
Baltimore & Ohio.....	8,494,927	7,660,628
Chesapeake & Ohio.....	7,531,975	6,051,476
Norfolk & Western.....	2,771,896	2,688,489

Norfolk & Western and Baltimore & Ohio tonnages are from July 1.

A number of items have appeared in the daily papers relative to an increase in the price of bituminous coal, particularly of coal from the central Pennsylvania district. Of course the operators are desirous of getting the full market value for their product, but I think the general impression conveyed by the articles in question gives an exaggerated idea of the situation. There has not been any agreement entered into by the producers to charge 50 cents or any other price above the present mark. It is expected that some further advance will eventuate if the present demand for coal continues, but as the price has already been advanced about 50 cents from the low water mark of the summer season shippers do not anticipate that a large or long continued advance will be added on to the present figures. Temporarily, under stress of circumstances, a higher price might prevail, but a rate of \$2 at the mines in central Pennsylvania, which is what a 50-cent advance would mean, is not likely to be realized.

The Finance Committee of the United States Steel Corporation has decided to offer the employees of the corporation and its subsidiaries the privilege of subscribing for preferred stock at \$103 per share under the same conditions as in previous years. The price at which employees were given the privilege to subscribe last December was par, and at that time 12,256 employees subscribed for a total of about 24,000 shares.

The gross November business of the Westinghouse Electric & Mfg. Company, Pittsburgh, was \$4,000,000, and of the Westinghouse Machine Company \$2,000,000, breaking all previous records for the amount of business done by these companies.

## New York.

NEW YORK, December 19, 1906.

**Pig Iron.**—The feature of the market is the demand for and the amount of business being done for delivery during the second and third quarters, the latter particularly. In some cases the purchases are being made for the fourth quarter. During the past two weeks New England has taken between 25,000 and 30,000 tons of Foundry Iron. Eastern Cast Iron Pipe manufacturers have bought an aggregate of about 15,000 tons, and eastern Pennsylvania Steel makers a total of about 75,000 tons of Basic Pig, with further negotiations pending. We quote Northern Foundry Iron for delivery during the first half at \$26 to \$27 for No. 1 Foundry, \$24.50 to \$25 for No. 2 and \$24 to \$24.50 for No. 2 Plain. Southern Iron is quoted on the basis of \$22.50 to \$23 for the third quarter for No. 2 Foundry. Scotch Iron, which is scarce, is selling at \$24.50 to \$25, ex-ship, duty paid, while No. 3 Middlesbrough is fetching \$22.50 to \$23.

**Steel Rails.**—Business keeps up in spite of the fact that deliveries that can now be promised are limited to the second half of 1907. The largest order of the week is 19,000 tons for the Texas Railway, which will be rolled at Pittsburgh. The Great Northern has placed 15,000 tons additional, and the Spokane Inland and the Monon have bought 7000 tons and 5000 tons, respectively. Miscellaneous orders of the week amount to 7000 tons. Among business under negotiation is 25,000 tons for a Western road.

**Structural Material.**—The rate at which specifications and new contracts have come in recently, particularly the former, appears to have cleared up to a large extent the doubts expressed a short time back as to the ability of building operations to keep Structural mills up to the general pace in rolling mill operations. The absence of large contracts is still noticed, but fabricating and erecting companies continue to figure on a large amount of work. The bids were opened in the past week for the Steel work on the viaduct approach to the Blackwell's Island Bridge from the Long Island side. The lowest bid, that of the Buckley Realty Construction Company, which appears for the first time as a bidder for such work, was \$797,804; the next to the lowest, \$885,830, by the Snare & Triest Company, and the next to that, \$918,098, by the American Bridge Company. About 8300 tons of Steel will be required. A number of bridge contracts, all less than 1000 tons, have been let in the week, including 600 tons for the Pittsburgh, Shawmut & Northern, taken by the Pennsylvania Steel Company, various bridges for the Central Railroad of New Jersey, taken by Lewis F. Shoemaker & Co., McClintic-Marshall Construction Company, Pennsylvania Steel Company and American Bridge Company. The last named company has booked two San Francisco orders—500 tons for the Sachs Building and 300 tons for the Metropolitan Laundry. It has received 2400 tons additional for the Indiana Steel Company buildings at Gary, Ind.; 500 tons for National Tube Company new construction at McKeesport, Pa. It will also fabricate and erect the Steel for the new Fall River, Mass., bridge, the general contract for which has been let. The King Bridge Company has a 600-ton bridge contract from the Lake Shore Railroad. Bids are to be opened to-day on contract No. 17 for the Erie barge canal, three bridges calling for 1300 tons of Steel. We quote prices unchanged on tidewater deliveries, mill shipments, as follows: Beams, Channels, Angles and Zees, 1.84½¢; Tees, 1.89½¢; Bulb Angles and Deck Beams, 1.90½¢. On Beams 18 to 24 in. and Angles over 6 in. the extra is 0.10¢. Sales out of stock of material cut to length are made at 2½¢.

**Bars.**—The transactions in Bar Iron have recently grown considerably larger, and quite a number of sales are reported of 1000 tons and larger. While the usual price has been 1.89½¢, tidewater, an occasional sale is made at \$1 a ton under this rate, but in such cases it is understood that the sale consists of very desirable sizes or is due to some other special circumstance. Manufacturers claim that even the 1.89½¢ rate does not adequately cover the margin between the cost of raw material and the market price. Steel Bars are quoted at 1.74½¢ to 1.84½¢, tidewater, but those naming the lower price are not in a position to make early delivery.

**Plates.**—Another advance of \$2 per ton was made by leading Eastern manufacturers December 14. This makes a total of \$6 per ton advance in price in the past month. The reason for the last advance is the continued increase in cost of raw materials. As the Western manufacturers have not yet brought their prices up to the level of those fixed in the East quotations now show a wide range, as follows, at tidewater, in carload lots: Sheared Tank Plates, 1.84½¢ to 2.04½¢; Flange Plates, 1.94½¢ to 2.14½¢; Marine Plates, 2.24½¢ to 2.44½¢; Firebox Plates, 2.75¢ to 3.50¢, according to specifications.

**Cast Iron Pipe.**—The city of Baltimore opens bids to-day on 2100 tons of Water Pipe. New England users of Pipe continue to buy freely. A feature of the New England

trade, however, is the fact that Boston parties some months since purchased Pipe quite heavily by way of speculation, and they are now underbidding manufacturers and several contracts have recently been secured by them in such competition. This is only an incident, as the general inquiry is large and the business coming to manufacturers is so great as not to be affected in any important particular. Among other contracts to be placed this week is one for Cast Iron Pipe for pneumatic tubing, for use in several of the large cities. While some foundries are still in a position to take small sizes for delivery in the early spring months, others are so well sold up on such sizes that they are now booking orders for June and July delivery. This is a condition never before seen in the Pipe trade. Prices are very firm at \$35 to \$35.50 per net ton, tidewater, for 6-in. Pipe, without regard to time of delivery.

**Old Material.**—The market is not quite so active as it has been. Not so much interest is being displayed by large buyers as a week or two ago. Several of the large Steel companies in eastern Pennsylvania purchased quite heavily from those who had the material and are now shipping it to them. Of all grades of Old Material Heavy Cast Scrap leads the list as far as the demand is concerned. Sales of 2000 tons are known to have been made the past few days at full prices for delivery from January to March. Old Car Wheels are scarce, and about 25¢ per ton higher. Several good sized sales of Borings and Turnings have been made, and some of the leading consumers are now out of the market, having covered their requirements for two or three months. Of Rolling Mill Material No. 1 Railroad Wrought seems to be the most active, having advanced 50¢ to 75¢ per ton within a week. Old Iron Car Axles are in decidedly good demand, and few are to be had at any price. The whole Scrap market is strong, and while many people who occupy a position in the trade which enables them to speak quite authoritatively are inclined to think that prices have reached their highest point, others feel equally confident that prices may go still higher before February 1. Approximate prices for New York and vicinity per gross ton are as follows:

Old Iron Rails.....	\$25.00 to \$25.50
Relaying Rails.....	28.00 to 29.00
Old Steel Rails, rerolling lengths.....	18.50 to 19.00
Old Girder and T-Rails for melting.....	16.25 to 16.75
Heavy Melting Steel Scrap.....	16.25 to 16.75
Standard Hammered Iron Car Axles.....	29.00 to 30.00
Old Steel Car Axles.....	21.50 to 22.50
No. 1 Railroad Wrought.....	21.50 to 22.00
Iron Track Scrap.....	19.00 to 20.00
No. 1 Yard Wrought, long.....	18.50 to 19.00
No. 1 Yard Wrought, short.....	18.00 to 18.50
Wrought Pipe.....	14.50 to 15.00
Light Iron.....	11.00 to 11.50
Cast Borings.....	10.50 to 11.00
Wrought Turnings.....	14.50 to 15.00
Old Car Wheels.....	21.75 to 22.25
No. 1 Heavy Cast, broken up.....	18.50 to 19.50
Stove Plate.....	15.00 to 15.50
Grate Bars.....	14.00 to 14.50
Malleable Cast.....	18.00 to 19.00

A new firm to deal in Structural Material has been incorporated under the name of George W. Jackson, Incorporated, with an authorized capital stock of \$3,000,000. The company has as its directors George W. Jackson and T. C. Jackson of Chicago, and J. B. Russel of the banking firm of J. B. Russel & Co., 46 Wall street, New York. Announcement will be made of the company's plans in the near future.

Difficulties have been experienced with suitable masts for the equipment required for communicating by wireless telegraphy between moving trains, for bridges and tunnels, as well as wires crossing the track, are in the way. A device adopted by a German engineer is to make use of a mast mounted much like a trolley pole. This can be lowered when approaching an obstacle. To make possible the automatic lowering of the mast a magnet-operated device is so arranged in conjunction with a contact on the track at a proper distance from the obstruction as to remove the mast from harm at the proper instant. This arrangement is a very simple one and is said to have been found very successful in practice.

Failure of the railroads to furnish cars to shippers and plans to bring relief are to be discussed at a national convention of shippers to be held in Chicago January 4. It is proposed that the present system of paying demurrage on cars held beyond a reasonable time for unloading or loading be continued, but it is suggested that the railroads pay a similar penalty for failure to supply cars within a reasonable time after being requested to do so.

A contract for 2000 all-steel gondola cars has been secured by the Chicago office of the Cambria Steel Company, Johnstown, Pa., from the Wabash Railroad, for shipment in the spring of 1907.

## Metal Market.

NEW YORK, December 19, 1906.

**Pig Tin.**—Prices have declined and but little business has been transacted, except on Tuesday. While there has been no pressure to sell, still holders of the metal are not anxious to carry stocks, particularly as tight money, both here and in London, is having its effect. The leading consuming interest has purchased a number of small lots. On Thursday and Friday sales were made at 42.90c., and on Monday at 42.82½c.; on Tuesday a further decline brought prices down to 42.50c. To-day Tin can be had at 42.37½c. The arrivals have exceeded shipments to the interior, 3259 tons having reached this country since the first of the month, and there being 2670 tons afloat. The shipments from the Straits for the first half of December were large, amounting to 2525 tons, and it is estimated that the total shipments for December will exceed those of a year ago—4825 tons. The London market is lower again to-day, closing at £194 12s. for spot and £195 5s. for futures.

**Copper.**—Prices are firmer, and the premiums for spot deliveries are larger, but actual business for nearby deliveries is almost at a standstill. The market is more or less nominal, except for future deliveries, which can be had at 23c. to 23.50c. for Lake, 23c. to 23.25c. for Electrolytic and 22.75c. to 23.25c. for Casting Grades. Premiums for prompt shipments would range between ¼c. and ¾c. above these prices depending on the size of the inquiry; in all probability a small order would receive a preference in the matter of premiums. Cask lots of lake have been sold at 24.50c., and 24c. is asked for small lots of Electrolytic. Casting Grades are scarce. The London market advanced rapidly, but a decline set in on Tuesday and continued to-day, closing at £106 10s. for spot, £107 15s. for futures and £112 for Best Selected. In Europe there is a good demand for all kinds of Copper, but Continental melters are drawing metal from other countries than this, as exports so far this month amount to but 7367 tons. There does not appear to be any falling off in consumption, but buyers are unwilling to purchase large quantities for future delivery.

**Pig Lead.**—The strength which was noticed late last Wednesday has continued, and on Thursday the American Smelting & Refining Company advanced its price governing outstanding contracts to 6c. This is the fifth change in price made this year by the leading producer, as on January 2 5.60c. was quoted, which was lowered February 14 to 5.35c., the lowest price of the year. April 30 the price of 5.50c. was established for two weeks, as on May 3 it was advanced to 5.60c., and again, on May 12, a further advance was made to 5.75c., which price continued for seven months, until December 13, when the present price of 6c. was established. There was a small lot of Eastern Lead which could have been had early to-day at 6.25c. Other spot Lead is quoted at 6.30c., New York, and 6.15c., St. Louis. There is no demand for forward deliveries. It is stated on good authority that the leading producer is not in a position to make shipments on new contracts before the last part of February.

**Spelter.**—There is an urgent demand from both galvanizing works and Brass mills. Some of the large producers have no metal to offer this side of February delivery. Prime Western is held at 6.67½c., New York, and 6.55c., St. Louis.

**Antimony.**—Prices in London declined to-day, but this had no effect on the market here. It is believed that there is more Antimony in this country than is generally supposed. Some talk is heard of a large consumer buying its next year's supply direct from the manufacturers in Europe. While Cookson's is quoted at 26c., it is understood that lower prices have been made. Hallett's is selling at 25c., and other brands at 24.50c. to 25c.

**Ferroalloys.**—In Ferrosilicon there is an upward tendency, and sales have been made at \$107. Ferromanganese is quiet, and can be had at \$78. Ferrochrome is unchanged, ranging from \$150 upward, according to analysis.

**Tin Plate.**—The price is unchanged at \$4.09 per base box, f.o.b. New York, and \$3.90, f.o.b. Pittsburgh. In Swansea prices are 1½d. lower, at 15s.

**Old Metals.**—Dealers' selling prices have advanced slightly and are quoted as follows:

	Cents.
Copper, Heavy Cut and Crucible.....	21.50 to 22.00
Copper, Heavy and Wire.....	21.00 to 21.50
Copper, Light and Bottoms.....	19.50 to 19.75
Brass, Heavy.....	15.50 to 15.75
Brass, Light.....	12.50 to 13.00
Heavy Machine Composition.....	19.50 to 19.75
Clean Brass Turnings.....	14.25 to 14.50
Composition Turnings.....	17.00 to 17.75
Lead, Heavy.....	6.00
Tea Lead.....	5.75
Zinc Scrap.....	5.00

An Oxford, N. J., dispatch mentions advances of 10 per cent. in wages made by three industries there—the Empire Steel & Iron Company, the Pequest Iron Company and the Bassitt Ore & Iron Company—all effective January 1.

## The Iron Molders' Union in 1906.

In reviewing the year 1906 the *Iron Molders' Journal* deals with the numerous strikes by locals of the Iron Molders' Union of North America, which have been the conspicuous feature of the year's record. We make the following extracts from its comments:

The overshadowing feature of the year has been the radically hostile attitude of the National Founders' Association toward our organization, and its effect on the hours, wages and the general prosperity of our membership. One result has been that more members have struck, and a heavier drain placed upon our reserve funds, than at any previous period of our existence. Since the latter part of April there have been from 1500 to 4500 members on strike, entailing an expenditure of strike benefits that at one period approximated \$30,000 per week. When, in connection with this, the regular expenses of the organization, death benefits, &c., coupled with the additional costs, legal and otherwise, entailed by the strike, are added, an idea may be formed of the enormous expenditure which the year will indicate.

All of our members in Montana secured an eight-hour day, in one instance coupled with an advance upon the minimum wage rate. Our members in two of the largest foundry centers, Cleveland and Cincinnati, Ohio, secured a nine-hour day, and the shorter workday was secured in many of the smaller localities. At this writing approximately 87 per cent. of our jobbing and machinery members have secured advances upon the minimum wage rate, ranging from 10 to 75 cents per day, the great majority have received an advance of 25 cents. In addition, thousands of our members working on piece work have received percentage advances, a general summing up indicating that over 45,000 members succeeded in securing improved conditions.

One of the surprising features of the year is found in the large number of molders who became active members through initiation, 6949 members having been initiated from January 1 to October 31. There is every reason to believe that when the local reports for November and December have been tabulated there will be shown a net increase in membership approximating 7500 for the year.

Naturally the optimistic view of the strikes of 1906 prevails in the statement sent out by the union's officers to the membership. The number of foundries added to the "open shop" list and the number of independent molders introduced into such shops since the May strikes, as given in the reports of the officers of the National Founders' Association, presented at the New York convention in November, are omitted, as are the facts concerning the remarkable increase in the free use of molding machines in foundries previously under union control.

## Labor Notes.

The Kilbourne & Jacobs Mfg. Company, Columbus, Ohio, without any demand, request or information from its men that they desired an increase in their wages, decided that an advance of 1½ cents per hour was due them, and made that advance commencing December 3. This means the addition of \$30,000 to a payroll which already exceeds \$500,000 annually. This corporation has a reputation for liberality to its employees, and now voluntarily acknowledges that the cost of living has so increased that they should receive larger returns for their labor.

The Milwaukee, Wis., molders' strike has ceased to be a matter of moment to the employers. According to Secretary W. J. Fairbairn of the Milwaukee Metal Trades Association, the present situation is very satisfactory. All of the shops now have their full quota of men at work, 1300 being employed, whereas at the beginning of the strike 1100 men walked out. Their places have been filled most entirely by nonunion men, not more than 15 or 18 strikers having returned to work. It is estimated that of the 1100 who struck about 400 are still in Milwaukee unemployed, the others having gone to other localities and obtained employment. While the men now at work are not claimed to be of equal skill as those originally employed they are fast becoming proficient, and are at present turning out almost a normal tonnage, and the percentage of good castings about equals the average before the strike. Indicative of the ease with which men can be secured, a little difficulty at the shops of the J. A. & P. E. Dutcher Company last week is cited as an example. Owing to some local differences the employees left their work, but their places were filled in the next three or four days.

## Iron and Industrial Stocks.

NEW YORK, December 19, 1906.

The stock market has been subject to alternating periods of advances and declines, due to alternating relaxation and tightening of rates on money. Evidently the time has not yet arrived when available funds will be sufficient for the needs of both dealers in stocks and the mercantile and manufacturing interests. Those who have occasion to borrow money on time are now finding that rates have hardened and loans are difficult to secure at strictly legal rates of interest. The fluctuations from Thursday of last week to Tuesday of the present week in active stocks have been as follows: United States Steel common  $47\frac{1}{8}$  to  $49\frac{1}{8}$ , preferred  $103\frac{3}{8}$  to  $105\frac{1}{8}$ ; Car & Foundry common  $42\frac{1}{4}$  to 44; Locomotive common  $71\frac{1}{4}$  to 74; Steel Foundries preferred  $45\frac{1}{2}$  to  $47\frac{1}{2}$ ; Colorado Fuel 55 to  $57\frac{1}{4}$ ; Pressed Steel common  $53\frac{1}{2}$  to  $55\frac{1}{2}$ ; Railway Spring common 53 to  $54\frac{1}{2}$ ; Republic common  $37\frac{3}{4}$  to 40, preferred  $96\frac{1}{4}$  to  $98\frac{1}{4}$ ; Sloss-Sheffield  $74\frac{3}{4}$  to 77; Tennessee Coal  $157\frac{1}{2}$  to 160; Cast Iron Pipe common  $45\frac{1}{2}$  to  $46\frac{1}{4}$ ; Can preferred  $54\frac{1}{2}$  to 56. Last transactions up to 1.30 p.m. to-day are reported at the following prices: United States Steel common 47, preferred  $103\frac{3}{8}$ ; Car & Foundry common 41, preferred  $101\frac{1}{8}$ ; Locomotive common  $71\frac{1}{4}$ , preferred 111; Steel Foundries preferred  $44\frac{1}{2}$ ; Colorado Fuel  $54\frac{3}{8}$ ; Pressed Steel common  $51\frac{3}{4}$ , preferred 99; Railway Spring common  $52\frac{1}{2}$ ; Republic common  $37\frac{1}{2}$ , preferred  $96\frac{1}{4}$ ; Sloss-Sheffield common 74; Tennessee Coal 160 $\frac{1}{2}$ ; United States Cast Iron Pipe common  $45\frac{3}{8}$ ; Can common  $54\frac{1}{2}$ , preferred  $54\frac{1}{2}$ .

First mortgage 5 per cent. bonds amounting to \$2,500,000, for extensions and improvements, have been issued by the Inland Steel Company, Chicago, and are being offered by Sidney C. Love & Co., New York and Chicago. The security underlying the bonds is placed at \$9,000,000, and by the terms of the mortgage \$1,500,000 of the underlying security shall be kept in cash and quick assets, and while any of the bonds are outstanding shall not be less than \$1,500,000 until the issue is reduced to this amount, and thereafter never less than the amount of the issue outstanding. The remaining \$7,500,000 of assets is in ore and coal property, plant and equipment of the Inland Steel Company. The bonds are offered at  $97\frac{1}{2}$  and interest. It is stated that for the year ending June 30, 1906, the net profits of the Inland Steel Company were \$860,766.15, and the net earnings since July 1, this year, are at the rate of over \$1,000,000 per annum. On an estimated output of 150,000 tons of steel ingots a year, the net earnings per ton amounted to approximately \$5.75.

The American Locomotive Company has sold through Harvey Fiske & Sons, Boston, \$5,000,000 of one to five year 5 per cent. notes. The notes mature serially in amounts of \$1,000,000 yearly. The one and two year notes have been sold on a 6 per cent. basis, and practically all of the issue has been placed. The statement is made that the amount thus realized is to be used for increased working capital required by the very large amount of business which the company is now doing.

**Dividends.**—The American Iron & Steel Mfg. Company has declared a quarterly dividend of  $1\frac{1}{4}$  per cent. on the preferred and 2 per cent. on the common stock, both payable January 1.

The Empire Steel & Iron Company has declared a semi-annual dividend of 3 per cent. on the preferred stock, payable January 1.

The Garvin Machine Company has declared a semi-annual dividend of  $3\frac{1}{2}$  per cent. on the preferred stock, payable January 2.

The Otis Elevator Company has declared a quarterly dividend of  $1\frac{1}{2}$  per cent. on the preferred stock, payable January 15.

The Rhode Island Perkins Horse Shoe Company has declared a quarterly dividend of  $1\frac{1}{4}$  per cent. and an extra dividend of  $\frac{1}{2}$  per cent. on the preferred stock, payable January 15.

The Canadian Westinghouse Company, Limited, has declared a quarterly dividend of  $1\frac{1}{2}$  per cent., payable January 1.

The Crucible Steel Company of America has declared the regular quarterly dividend of  $1\frac{1}{2}$  per cent.

The American Nut & Bolt Fastener Company, Pittsburgh, has declared a regular quarterly dividend of 5 per cent. and an extra dividend of 10 per cent., payable December 20.

The Westinghouse Air Brake Company, Pittsburgh, has declared the regular quarterly dividend of  $2\frac{1}{2}$  per cent. and an extra dividend of  $2\frac{1}{2}$  per cent., payable January 10.

The International Nickel Company has declared a quarterly dividend of  $1\frac{1}{4}$  per cent. on the preferred stock, payable February 1.

The Westinghouse Electric & Mfg. Company has declared a quarterly dividend of  $2\frac{1}{2}$  per cent. on the preferred assenting and nonassenting stocks, payable January 10.

The Standard Coupler Company has declared the regular semi-annual dividend of 4 per cent. on the preferred stock

and a semi-annual dividend of 2 per cent. on the common, making 4 per cent. on the latter for the year, payable December 24.

## Customs Matters.

### Carding Engines.

The Board of United States General Appraisers, in a decision promulgated December 12, denies the contention of the Government that separates duties accruing on carding engines and their accompanying clothing. Instead, the board holds that the machines are to be regarded as entireties. It is believed that the ruling will affect a wide range of machinery imports. The customs tribunal sustains the contention of Evan Arthur Leigh, Boston, that carding engines are dutiable at the uniform rate of 45 per cent. under the provision for manufactures of metal. The identical issue was decided by the board favorably to an importer some time ago. The Government then took the case into the United States Circuit Court, but it was dropped before trial owing to the resolution of the Treasury Department to make up a new case, which it was thought would prove a stronger presentation of the Government's position on the question. This was the case decided yesterday for the second time adversely to the Treasury. The importer's victory is the more substantial owing to the exertions of former Appraiser Snelling of Boston and influential domestic manufacturers of machinery to compel imported machinery to pay the heaviest rates of duty. Further than this, the board's finding is likely to affect a wide range of merchandise, and for this reason the Secretary of the Treasury is expected to ask the Circuit Court to review the lower tribunal's decision.

The carding engines were imported, as machinery ordinarily is, in a knockdown condition, and were packed in a number of cases. Some of the portions of the machines, apart from the card clothing, were made of wood and some of metal, but duty was assessed on all the parts at the rate of 45 per cent., under paragraph 193, as articles of metal. On the card clothing part, however, duty was taken at the rate of 45 cents per square foot under paragraph 146. This action on the part of the customs authorities was objected to by Mr. Leigh, who insisted that the carding engines and card clothing therefor constitute entireties and that duty should have been assessed accordingly, at the same rate as that applied to the other portions of the merchandise. The Government's view is that as card clothing is specifically provided for in the tariff law, it is proper to exact a duty on the material regardless of the condition in which it is imported.

In harmony with the decision in the carding machine case, the board has denied a claim filed by the Austin Mfg. Company, Chicago, regarding the classification of road rollers. Oddly enough, in this case the Government contended that the articles should be assessed as entireties, whereas the importers desired duty levied on the various parts.

### The Molders' Patterns Case.

The United States Supreme Court December 17 declined to issue a writ of certiorari in the case of R. Hoe & Co., New York, involving the tariff classification of molders' patterns. This action of the tribunal of last resort terminates a long standing litigation, and will have the effect of admitting the patterns free of duty as contended by the importers. The denial of the writ, which was asked for by the Government and opposed by Hoe & Co., leaves the decision of the United States Circuit Court of Appeals as the guide to be followed in the admission of the patterns, the appellate tribunal holding that the articles are entitled to free duty under paragraph 617 of the tariff act. It has been the Government's contention that the patterns are properly dutiable as manufactures of wood with assessment at the rate of 35 per cent. The Supreme Court reached its conclusion not to review the finding of the lower court after the reading of elaborate briefs for and against the granting of the writ.

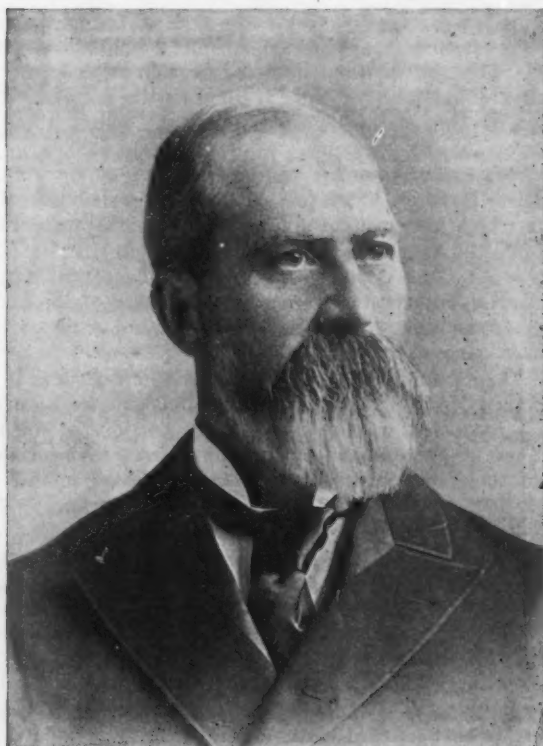
## OBITUARY.

HENRY J. HENDEY.

A brief notice was printed last week of the death of Henry J. Hendey, president of the Hendey Machine Company, Torrington, Conn., which occurred December 8. A portrait of the deceased is herewith given.

Mr. Hendey was born in London, England, December 20, 1844. With his father he came to this country in 1848 and located in Waterbury, where he spent his boyhood and early manhood. In 1865 Mr. Hendey removed to Torrington and entered the employ of the Turner & Seymour Company as a machinist, a trade which he had learned in Waterbury.

In July, 1870, Mr. Hendey and his brother Arthur commenced business in a small shop built by themselves. Their motive power was a small rotary steam engine of 3 hp., built by one of the brothers for amusement during



HENRY J. HENDEY.

winter evenings. It is now carefully preserved as a relic of a humble beginning. In this shop, 18 x 24 ft., they commenced the work of making and repairing machinery, and their business grew steadily. The Hendey Machine Company was established August 22, 1874, with a capital stock of \$16,000. The small plant has been largely increased from time to time and employs to-day 600 men, electricity being the motive power. The factories are of the most modern construction, equipped with the latest and best machinery. The present capital stock of the company is \$300,000, and the officers during the past year have been: President, Henry J. Hendey; secretary, Charles H. Alvord; treasurer, Frederick F. Fuessenich.

Mr. Hendey had been president of the company since 1883. He held a number of local offices, and in 1903 was a member of the Legislature, where he served on the Committee on Manufactures.

RUFUS WOODWARD GILLETT, president of the Detroit Copper & Brass Rolling Mills, Detroit, Mich., died suddenly December 3. Mr. Gillett was at the company's offices in the morning, and after departing for his home and arriving there he was stricken with heart failure, his death resulting within a few hours. He was born at Torrington, Conn., April 22, 1825. From 1856 to 1862 he was secretary and treasurer of the Wadsworth Brass Company, thus acquiring a knowledge of the business

which resulted in the establishment of the Detroit Copper & Brass Rolling Mills, of which he was one of the organizers. He was elected president of the company in 1894, occupying that position until his death. He was also vice-president of the American Harrow Company, and was interested in a number of other business enterprises in Detroit and vicinity.

WALLACE CLYDE JOHNSON, a well-known civil engineer, died at his home in Niagara Falls December 15, the cause of death having been an acute attack of dilation of the heart superinduced by overwork. He was born in Granville, Mass., May 21, 1859, was graduated from Williams College in 1882, and from the Worcester Polytechnic Institute in 1884. In 1886 he became chief engineer of the Niagara Falls Hydraulic Power & Mfg. Company. He held this position until 1900, when he became the company's consulting engineer. Up to this time the greater part of that company's development was made under his direction. He was so successful in his Niagara work that many other places sought his services. He planned the development of the Shawinigan Falls, the Hannawa Falls, the Albion Power Company, the Empire State Power Company on Schoharie Creek, the Bodwell Power Company in Oldtown, Maine, and many other notable power works in various parts of the country. He was a member of the State Water Supply Commission, American Society of Civil Engineers, American Society of Mechanical Engineers, Engineers' Society of Western New York, of which he was at one time president; associate member of the American Institute of Electrical Engineers and associate member of the Society of Arts, London, England. He leaves a widow.

GEORGE W. REMINGTON, president of the Remington Machine Company, Wilmington, Del., died December 12, aged 67 years. He was ill only a few days. He is survived by a widow and two daughters.

JOHN SELLERS, JR., a member of the firm of William Sellers & Co., Incorporated, Philadelphia, died December 15 at his home in Millbourne, Pa., aged 86 years. He was attacked with paralysis and died after an illness of but 24 hours. He was one of the founders of the Union League of Philadelphia.

## PERSONAL.

J. B. Ayres, for some time connected with the National Tube Company, McKeesport, has been appointed superintendent of the construction and mechanical departments.

E. J. Cutting, secretary of the Morgan Spring Company, Worcester, Mass., has resigned his position to establish himself at Seattle, Wash., where he will engage in the drug manufacturing business.

George Brooke of the E. & G. Brooke Iron Company, Birdsboro, Pa., is stated by the *Bulletin* of the American Iron and Steel Association to be 89 years old, or the oldest of all our active iron manufacturers. He has been connected with the works of his company for 71 years.

John Howard Alexander, formerly engineer with the Hamilton Bridge Company, Hamilton, Ont., is now concrete engineer of the General Fireproofing Company, Youngstown, Ohio.

Charles A. Blatchley, having resigned as chief of the Engineering and Machine Division of the United States Bureau of Engraving and Printing at Washington, D. C., will on January 1 open an engineering office in the Drexel Building, Philadelphia. Mr. Blatchley will give special attention to plans and specifications of complete mechanical and electrical installations.

United States authorities, comprising the Mint and the Geological Survey, have agreed that the total number of ounces of gold produced in the United States in 1905 was 4,265,742, valued at \$88,000,000. In the gold production of the countries of the world in 1905 Africa took first place with \$113,000,000; the United States came second with the amount as above given, and Australia third with \$85,000,000.

## The Machinery Trade.

NEW YORK, December 19, 1906.

In comparison to the business transacted a month or so ago the machine tool trade has quieted down considerably and it is expected that there will be no increase in activity until after the first of the new year. Numerous orders for a few tools were placed during the week and inquiries for small lots were received in good volume, principally for industrial works. The railroads, which were fairly busy placing scattered orders up until last week with an idea of closing out the year's requirements as far as possible, have stopped buying and it is generally understood that they will not do much until the new year's list of machinery needs is made up. The Delaware, Lackawanna & Western Railroad, it is said, has about completed its purchases for the large Kingsland, N. J., shops, and the Erie Railroad has accomplished some hurried buying within the last few weeks to meet machinery needs at Harrisburg, Pa., where a new system of yard shops is being built. From all accounts, however, the Harrisburg improvements have not been entirely provided for and it is expected that there will be some machine tool and blacksmith shop equipment for that division included in next year's requirements.

### Japanese Making Large Purchases.

Several orders were closed out within the week by the Japanese interests who have been purchasing for the Imperial Steel Works of Japan, whose extensive list of steel mill requirements was distributed in the trade about three months ago. At that time it was supposed among the American manufacturers that they could not compete with the German trade, which it was given out received a list about the same time as the manufacturers in this country. It afterward developed, however, that business in Germany was in much the same condition as it is here, and when German manufacturers could not offer any better terms of delivery than those from this side of the water machinery men here were given to understand that it would pay them to do some active speculating on the work. During the last two weeks some orders have been placed against the list, and the same purchasing agencies that sent out the original list have added some supplementary requirements. In addition the trade has been given a chance to bid on an extensive lot of machinery for other Japanese interests, and it is declared in the trade that the Americans have a good chance to capture the majority of the business. The original list for the Imperial Steel Works included two bar mills and a tube mill, blooming mill, rolling tables, furnaces, cranes and a general outfit of steel making equipment. The list was sent out by a number of the large Japanese purchasers, and last week Mitsui & Co., 445 Broome street, New York, gave an order to the Mesta Machine Company for a 6 in. and a 10 in. bar mill, both complete with rolls, one tandem compound Corliss engine, 26 and 40 x 38 in., a straightening machine, two lever shears and other equipment. This order by no means covers all of the equipment included in the first list, and it is but a small part of the buying that the Imperial Works expects to do before summer sets in. The Japanese purchasing houses are asking special terms as regards delivery, but it is said in the trade that they are invariably willing to place orders for equipment that can be delivered within nine or ten months. Among other equipment on which the Japanese houses are getting bids just now are a general line of machinery for a lead mill and a complete outfit for a tin plate mill. These orders, it is expected, will be placed in this country, and it is thought that considerable business in the electrical machinery line, especially in the way of equipment for street railroads, will be closed shortly.

The machinery trade will be interested in the proposition made by the United States Steel Corporation to acquire property in Newark, N. J., for a large storage warehouse, to be built at a cost of about \$900,000. The plan, which is explained in another column, is to erect a building for the storage of structural material, sheets, plates and bars, and it will involve the purchase of considerable conveying machinery, as well as cranes and the like. As yet none of the equipment has been purchased, and as the company expects to begin building by June 1 the trade will probably hear of requirements for power equipment and other machinery very shortly. There is much discussion just now over the announcement made in the last issue of *The Iron Age* of the plans of the United States Steel Corporation for 1907, and the steel mill equipment and power men are anticipating a good year's business, judging from the important additions in those lines the company expects to make.

A movement is on foot for the establishment of a car wheel plant in Montreal, Canada, at the head of which is

understood to be Graham Fraser, who was formerly connected with the Nova Scotia Steel & Coal Company and the Dominion Iron & Steel Company. Mr. Fraser and associates have secured a large block of land near Longue Pointe, for which they paid \$65,000.

Specifications are being prepared by the Graham Nut Company, Pittsburgh, Pa., for the machinery it will require for equipping the additions to its plant at Neville Island, Pa., where it will erect new buildings, practically doubling the present capacity. Two new buildings will be constructed, one 60 x 200 ft. and the other 95 x 100 ft., in which will be installed entirely new equipment, consisting of hot presses, nut machines, cold punch nut machine and several classes of bolt heading machines of the latest type. The buildings will be of brick and steel construction and their construction will be in charge of J. M. Stetter, who will be general superintendent of the plant.

The Struthers Furnace Company, Struthers, Ohio, contemplates purchasing two new cross compound condensing blowing engines.

No definite plans have been prepared for reconstructing the foundry of the American Locomotive Company at Providence, R. I., which was recently destroyed by fire, and it is probable that rebuilding will not be commenced before spring. The rebuilding of the plant will probably necessitate the purchase of additional machinery, of which the company has bought a great deal within the past few months. Only a few weeks ago purchases of considerable equipment were being made for its plant at Richmond, Va., where it is spending about \$500,000 on improvements.

Considerable equipment will probably be required by the Carter Motor Car Corporation, Muncie Building, Washington, D. C., which has decided to erect a plant in the suburbs of that city for the manufacture of automobiles. The company has a large plant in Detroit, Mich., and will erect the new one to supply the Eastern trade. The new buildings will be constructed of concrete and are expected to be ready for operation by early spring. The company makes a two-engine motor car, the engines working singly or as one unit. The company claims a considerable saving of cost in operation by its system. A. Gary Carter is president; J. C. Duke, first vice-president; Frederick A. Dodge, second vice-president; Edward Richards, third vice-president; William Arrison, fourth vice-president; W. Shirley Carter, secretary, and Frank L. Carter, treasurer.

The Atlantic Insulated Wire & Cable Company, 120 Liberty street, New York, whose plant at Stamford, Conn., was burned down a short time ago, is rebuilding, and the company is purchasing the machinery for the equipment of its new plant.

While practically all of the machinery which the General Fireproofing Company, Youngstown, Ohio, will require for equipping the new additions to its plant is specially designed by itself and partly built, some equipment will be purchased before the first of the year. The company intends adding about 400 hp. to its boiler equipment and installing a 200-kw. direct connected engine and generator, contracts for which will probably be closed within the next week or 10 days. The 10-ton electric traveling crane with 95 ft. span and 350 ft. travel, which is to serve its new bar storage yard, will also be contracted for before the first of the year. The company has under way extensive improvements to its plant, including the construction of several large buildings.

P. A. Young, Charleston, W. Va., who has opened an office for the sale of mine, mill and electrical supplies, would like to correspond with those desiring representation in that district. Mr. Young will place a stock after the first of the year to cover all the demands of his immediate territory.

The purchasing department of the Hudson Companies has been placing orders of late for the power house of the McAdoo tunnel system, to be located in Jersey City on the block bounded by Washington, Green, Bay and First streets, and which will supply all the power for the two tunnels as well as the terminal station on Church street. The building will be 200 x 230 ft. and 108 ft. high. The structure will be divided into two sections in one of which will be the generating plant, in which will be two 3000-kw. turbo-generators and three 6000-kw. turbo-generators. The immediate installation will aggregate 18,000 kw., although the building has been designed to accommodate equipment for generating 36,000 kw. ultimately. There will be a tower at the easterly end of the boiler house which will be equipped with machinery for elevating the coal from the yard to the distributing conveyors, and it is planned to deliver the coal by trains to the door of the tower and it will then be hoisted to the roof and fed automatically by gravity to the furnaces. The conveying apparatus will be furnished by the Robins Conveying Belt Company. The building will be equipped with eight Babcock & Wilcox boilers of an aggregate capacity of 24,000 hp. The boilers will be supplied with superheating apparatus and the equipment will include everything that goes to make up a first-class power house. The building was designed by Robins & Oakman, 26 East Twenty-sixth street, New York, and L. B. Stillman, 100 Broadway, is the consulting engineer.

Inquiries are being made in the trade by A. Innerhofer, 79 Duane street, New York, for the G. Seigel Company of the same address, for a 75-kw. generator and a 110-hp. engine. The Seigel Company is erecting a new color plant and the machinery is wanted for furnishing the power.

The Taylor Textile Mfg. Company, 41 Union square, New York, will erect a new one-story brick factory, 47 x 105 ft., on the southwest corner of Bronxwood avenue and 218th street, New York, at a cost of \$20,000. The company will install an engine of about 100 hp. and boilers to correspond. Bids can be sent to Mr. Taylor in care of the company's office and they will be finally decided upon by J. S. Kennedy, the architect.

**Catalogues Wanted.**—The Pee Dee Iron Works, Cheraw, S. C., machinist, founder and dealer in machinery and supplies, desires catalogues, price lists, circulars, &c.

### Chicago Machinery Market.

CHICAGO, ILL., December 18, 1906.

Further extensions to the new plant of the Indiana Steel Company, Gary, Ind., announced by the Finance Committee of the United States Steel Corporation, will involve an expenditure of fully \$10,000,000 in the next two years, and the already congested condition of the plants of builders of engines, electrical equipment, rolling mills, &c., will undoubtedly delay the completion of the work to a considerable extent. By the addition of four blast and 28 open hearth furnaces the original installation will be doubled, and this includes the power generating, ore handling and other equipment. Although not definitely decided, it is probable that there will be no change in the types of the original installations, although bids will be asked on all the work and the method of procedure in awarding contracts will be the same as on the work now under way. Although not included in this announcement, work is now proceeding on the plans of four merchant mills—8, 10, 12 and 14 in. respectively—and bids will shortly be asked for their construction. As the makers of rolling mills have their output sold practically through 1907, it is doubtful if deliveries can be secured before the following year.

Plans for several of the buildings which will comprise the new shops of the Grand Trunk Railroad at Battle Creek, Mich., have already been favorably passed upon by the company from the plat submitted by the contracting engineers, and bids for their construction are now being received by the Arnold Company, 181 La Salle street, Chicago. The buildings that will be erected immediately consist of the locomotive shop, 170 x 817 ft.; blacksmith shop, 100 x 225 ft., and store and oil house, 60 x 200 ft. The size of the power house has not yet been definitely fixed, but as it is to be one of the original group action will be taken in a few days. Other departments proposed, but not definitely decided upon, include a foundry, pattern and locomotive carpenter shop, frog shop, planing mill, coach, paint, freight car and truck shops. The locomotive shops as designed will have 20 pits for the present, and provisions have been made for five more for future extensions. Equipment for the locomotive and blacksmith shops and the power house will be purchased in the near future, although the lists have not yet been promulgated.

The Union Pacific Railroad is building new shops at Omaha, Neb., at a cost of \$200,000, which does not include the equipment. The shops are to be built in the form of an L, of steel construction, with brick walls. The coach and cabinet shop will be 178 x 342 ft., and will be 21 ft. high from the floor to the bottom chord of the roof truss. The car repair shop will be 150 x 342 ft. and 26 ft. high. Contracts for tools for the new plant will be awarded shortly.

Contracts for the machinery requirements for the new Kansas City Southern shops have been awarded by the Arnold Company of this city. On most of the equipment deliveries cannot be secured in less than six months, reflecting the filled order books of the machine tool manufacturers. The shops are being built at Pittsburg, Kan.

The Common Council of the city of Menominee, Mich., has voted to vacate two blocks of city thoroughfare for the use of the Prescott Company of that city, the only condition being that if the property should be vacated by the company it shall be turned back to the city without consideration. This gives the Prescott Company four solid blocks of city property, fully two blocks of which are at the present time covered by its factory buildings. It is probable that the proposed building operations during the coming year will almost cover the new plat.

The Hildreth Mfg. Company, Lansing, Mich., manufacturer of pumps, marine gas and gasoline motors, has purchased the plant of the Lansing Foundry Company and will immediately remodel it and increase its capacity. The company will not only manufacture its own castings, but will

have sufficient output to meet a large part of the local demand. Its capital was recently increased from \$30,000 to \$75,000.

The Howe Scale Company, Chicago, manufacturer of scales, conveying machinery, scoops, &c., has decided to move into more commodious quarters at 1315 to 1325 Wabash avenue about May 1. The salesrooms and office are at present at 40 to 50 Lake street.

The city of Topeka, Kan., is receiving bids on the cost of rebuilding its electric lighting plant. New equipment to be purchased includes two 300-hp. cross compound engines, two boiler feed pumps, switchboard, transformers and regulators, and automatic stokers for the boilers.

### Philadelphia Machinery Market.

PHILADELPHIA, PA., December 18, 1906.

Buying has been rather light in the local market, and there seems to be but little prospect of any material improvement for the remainder of the present month. Practically all of the business transacted in the general line of machine tools has been in small lots, single tool propositions predominating. The makers of heavy special tools, however, have closed up some rather fair business which has been pending some time, the sales having been largely for delivery in the Middle West. The local buying for any extensive equipment at the time is noticeably light.

Inquiries, considering the season of the year, are good but resultant orders are few. In a number of cases quotations are being obtained, it is said, for the purpose of presenting clearly, with annual reports, the probable cost of contemplated additions to equipment early in the coming year. The machinery programmes for 1907 of the various local railroad companies are slow in coming to a head, but it is understood that that of the Pennsylvania Railroad Company has been prepared, and is now the subject of consideration. Few propositions of any magnitude are looked forward to until late in January, and some which are now being looked into will probably not develop until even a later date.

Manufacturers are operating their plants at their best capacities, although little headway is being made in the direction of improved deliveries on orders already in hand. The slight falling off in new business may help some at a later date, but the delays incident to obtaining raw and semi-finished materials, as well as those customarily encountered in the winter season, are apt to discount any gain due to the apparently temporary decrease in new business. Deliveries continue the most important feature to be considered in making sales, and could purchasers' wants be supplied in a reasonably prompt time the volume of business at the time would without doubt be very materially increased.

There has been some improvement in the foreign demand, particularly for tools of a heavy special character, as well as for certain classes of power transmission equipment, and manufacturers of those lines have booked some very satisfactory business. In the standard machine tool lines the demand in this territory is rather small, manufacturers paying little attention to this business owing to their inability to take care satisfactorily of their domestic trade.

Boilers and engines are in fair inquiry only. At this season there is usually a falling off in the demand, particularly for equipment in the medium powers. Some good propositions are before the trade in the way of extensive power equipment, but these will not be closed in all probability for some time. Sales of second-hand boilers and engines are not very active and reflect, on the whole, the general conditions of the trade.

There is no let-up in the demand for second hand machine tools, as well as for certain classes of general machinery. If dealers could supply the needs of their customers promptly there would be no trouble to do business, but modern tools in good shape are not so plentiful as they were some time ago, and dealers find it hard to keep up stocks of the desirable sizes.

The foundry trades continue very active. Both steel and gray iron foundries are operating plants to their best capacities, but still are unable to meet the demands of the trade. In some cases a scarcity of molders hinders greater production, while in other instances the delays incident to scarcity of raw materials make prompt deliveries impossible.

The Suburban Electric Company will, it is understood, erect at Chester, Pa., a new power house to supply the surrounding towns of Lansdowne, Morton, Swarthmore, Darby, &c., with electric power. No definite data, however, are obtainable at this time.

Watson, Huckel & Co., architects and engineers, 1211 Walnut street, have completed plans and specifications for a new power house on which bids will shortly be asked, for the Croft Memorial Library of the Lutheran Theological Seminary, Mt. Airy, Philadelphia. The building will be two stories high, 50 x 80 ft., of brick and stone. Specifications for the power installation for the building are being prepared,

but details have not yet been decided upon. It is expected that they will be ready for bids in about 30 days.

The Delaware Hard Fibre Company, Wilmington, Del., will erect at Stanton, Del., a large vulcanized fiber plant. The proposed building will be 300 x 600 ft., and is to be fitted with the latest improved machinery.

The Standard Pressed Steel Company notes an increasing demand for its American Pioneer pressed steel shaft hangers from both foreign and domestic sources. A large demand has also developed for its new Globe pressed steel countershaft hanger, designed especially for the machine tool trade. Orders for hangers for 1907 delivery are being booked in good number, one recently being for over 400 hangers of various sizes for a domestic concern. Orders for export are numerous, and recent shipments include 850 hangers for export to Switzerland, Holland and Australia.

The Philadelphia Roll & Machine Company continues busy in every department. Orders for heavy machinery beds and special charcoal iron air furnace castings have been in good number, while, as is customarily the case at this season of the year, the immediate orders for extra heavy rolls are somewhat diminished. Light rolls for rubber, brass and copper rolling have been ordered freely. A heavy 18-in. merchant rolling mill for the Riverside Metal Company, Riverside, N. J., of which some mention has already been made in these columns, has been completed and has now been shipped.

The Newton Machine Tool Works, Incorporated, notes a very satisfactory condition of business, sales of all classes of tools being good, particularly cold saw cutting off machines, milling and slotting machines and large rotary planers, several orders for the latter being for export. The foreign demand for special tools is steadily increasing, orders having been booked for an extra heavy boring machine for electrical work and for portable slotting machines for England. A number of shipments for export account include two cold saw cutting off machines, a key seat milling machine, and a special milling machine for European parties, and a four-spindle rail drilling machine for Japan. Domestic shipments have been in good number also, and include a heavy vertical spindle milling machine, a heavy gear cutting machine for street railroad motor gear work, cold saw cutting off machines, slotting machines, milling machines and other special portable tools.

The Chapman Valve Mfg. Company, Indian Orchard, Mass., has moved its Philadelphia office and store to 1011 Filbert street.

## New England Machinery Market.

WORCESTER, MASS., December 18, 1906.

Thus far little change is noted in the machine tool market, resulting from the approach of the holidays, which, combined with the season of making inventory, usually has a slackening effect on the market. A careful canvas of the machine tool dealers of Boston, however, fails to reveal any falling off of their business. In several instances salesmen report having wound up the largest week's business for some time. While lots are not large as a rule, nevertheless, they are by no means confined to single tools, and a number of instances where nice orders were taken were included in the aggregate.

Dealers state that a considerable number of new metal and machinery manufacturing enterprises will be announced early in the coming year. They have been kept quiet because, as a usual thing, the interested persons are now employed in other establishments and are waiting to sever their connection with present employers until the end of the year. It is said that a wide range of product is included in their plans. Some of these men will be greatly disappointed in deliveries of equipment, for they have put off buying for one reason and another. Consequently they will not reach the point of producing goods for the market for months after they begin their active preparations.

New England designers are devoting considerable energy to the development of the alcohol engine, a number of new machines being in process of development and experiment. It is believed that the manufacture of several new engines of this type will begin next season, with the expectation of a ready market. The combustion engine generally promises to have a record breaking season in 1907, inquiries being more numerous than ever, and orders already aggregating large figures. Many purchasers are holding off, watching the possibilities of the alcohol type of engine.

Beaudry & Co., 141 Milk street, Boston, have incorporated their business as Beaudry & Co., Incorporated, with capital stock of \$10,000. The president is Alexander Beaudry; treasurer, Otto Abrahamson; clerk, Charles P. Searle, the officers constituting the Board of Directors. The company manufactures the Beaudry Champion power hammers.

The Boston & Worcester Railway Company, which operates an electric railroad between the two cities, will build a

combination repair shop and car barn at South Framingham, Mass., to replace a car barn destroyed by fire December 17.

The Glastonbury Power Company, Glastonbury, Conn., has let the contract for its new power plant to J. G. White & Co., New York. It is proposed to develop 1500 hp. and transmit it at 11,000 volts to Hartford, Conn. Two turbines of 750 hp. will generate the power, the water reaching them at 200-ft. head. A dam 600 ft. long and 60 ft. high will be built.

Machinery men are interested in the increase of capital stock voted by the American Woolen Company, from \$65,000,000 to \$75,000,000. The company has been a considerable purchaser of machine tools and equipment, generally, in the past, and it is believed that a part of the new capital will go toward improving manufacturing properties, including the bettering of repair shop facilities.

J. Walter Perry, Southport, Conn., is in the market for equipment to produce 15 hp. and electric generating apparatus for lighting purposes. He will manufacture brass, copper and bronze wire cloth for pulp and paper machines. He recently purchased a portion of the business of the C. O. Jelliff Mfg. Corporation and will conduct it in his own name.

The Hamblet Machine Company, Lawrence, Mass., manufacturer of revolving paper cutters, is building a small addition to its foundry.

The Stanley Works, New Britain, Conn., manufacturer of builders' hardware, is to build an addition to its factory building No. 6, to be 40 x 50 ft., five stories, to be used for manufacturing purposes.

Landers, Frary & Clark, New Britain, Conn., manufacturers of hardware specialties, will erect an addition and alteration to a foundry building, to be 44 x 185 ft., two stories, with die vault 30 x 35 ft., three stories.

The Success Mfg. Company, Gloucester, Mass., manufacturer of ash sifters, roof flanges, traps and sheet metal specialties, will be in the market for punching presses, spinning lathes and other equipment. The company has just been organized under Massachusetts laws to take over the business of Thomas P. Bolger & Co., 153 Main street, Gloucester. The capital stock is \$50,000, and the officers: President, Thomas P. Bolger; treasurer, Alfred E. Presson; clerk, M. F. Buckley; directors, these officers and M. J. Palson and J. Nagle.

The town of South Norwalk, Conn., has voted to establish a municipal electric light plant, to cost upwards of \$30,000. The plan calls for the purchase of engines, generators and all other equipment for an up to date lighting station.

A project is on foot at Lynn, Mass., for the erection of large buildings to be rented for manufacturing purposes. A tract of land containing 137,000 sq. ft. has been purchased, and plans now making by Wheeler & Betton, architects, call for buildings which will cover the greater part of the land, of brick and stone, and eight stories in height. The burning out of several large manufacturing establishments has given an impetus to the plan, and even without these possible tenants there is great demand for manufacturing space in the city. It is proposed to establish a large power station in connection with the building, equipped with turbine engines. The plans have not been formulated to the point of definite announcement of details.

The Chandler Planer Company, Ayer, Mass., manufacturer of metal planers, has completed the addition to its shops, and as soon as the new power equipment is installed will be operating with greatly enlarged facilities for manufacturing. The addition doubles the floor space. The original building, completed only a short time ago, is 76 x 128 ft. The extension is of the same dimensions, making a building 76 x 256 ft. An addition to the power house is being erected, and in it will be installed a 300-hp. Brown engine, which will drive generators. The works will be electrically driven throughout, the larger machines by individual motors, the remainder in groups. The company already operates two engines with united capacity of 200 hp.

Important changes have been made in the management of the American Ship Windlass Company, Providence, R. I., builder of steam windlasses, stokers, &c. Frank S. Manton has transferred the major part of his stock holdings to Robert S. Riley, Worcester, Mass., who becomes the treasurer of the corporation, Mr. Manton continuing as president. Mr. Manton has been one of the principal stockholders for many years, and has been connected with the company for half a century. He makes the statement that "the company has been under heavy expenses for some time, and it was recently decided to infuse new financial life into the business." The destruction of the main building by fire in 1904 necessitated the rebuilding of that part of the plant and the replacing of much of the machinery. The settlement of the fire loss and the incidental changes and improvements caused large inroads into the capital of the company, so that its condition was far from satisfactory. When the company introduced the new stokers on the market it became necessary to invest another large sum of money. They have become a paying investment, but necessitated a large capital to properly carry this increasing part of the business. At the present time the company is

in a very prosperous condition, and has a large number of orders on hand to keep the plant in operation for some months to come. The company is capitalized for \$100,000, but its business is worth four or five times that sum. Mr. Riley is the son-in-law of Milton P. Higgins, of the Norton Company, Norton Grinding Company and Pluger Elevator Company, Worcester, Mass.

The American Ship Windlass Company has issued a printed announcement under date of December 5, stating that owing to the unsettled condition of the metal market all quotations are withdrawn, and that orders will be accepted at prices which are in force at the time order is received, or prices will be quoted for immediate acceptance. The company explains that it has deferred increasing its prices just as long as it possibly could.

The plans of the Boston, New York & Cape Cod Canal Company, which proposes to construct a canal across Cape Cod, shortening the water route between Boston and New York and other southern points, have progressed so far with its plans that William B. Parsons, the eminent engineer, has prepared detailed plans which have been submitted to the inspection of the Massachusetts Railroad Commission, of whom permission was asked to issue 100 shares of stock to procure funds for the initiative step in the enterprise. It is proposed to later issue \$6,000,000 in stock and a like amount in bonds. August Belmont & Co., New York, have taken up the financing of the project, which will cost about \$10,000,000 and require not more than two and one-half years to complete. The canal will add much to the safety of coast traffic and will be of considerable advantage to freight.

### Cleveland Machinery Market.

CLEVELAND, OHIO, December 18, 1906.

The demand for machine tools remains very brisk among local machinery manufacturers and dealers, and the only trouble they are experiencing is with deliveries. All purchasers want immediate delivery, and dealers cannot promise delivery within 60 days and in many cases not for a much longer period. Orders are now being taken by local dealers that will not be filled for a year. The demand is general for all kinds of machine tools, and the orders, while numerous, are small, the majority of them being from factories that are increasing their capacity or are substituting new machines for old ones. Second-hand machine tools are in great demand but equally scarce, and if anything is offered in that line it is quickly snapped up. Local prices of machine tools have not been advanced the past few days, and there is a difference of opinion among dealers as to whether they will go higher. Some dealers think that prices must advance again on January 1 if the price of pig iron keeps up, and others think that prices have reached the top notch. One dealer received notice early this week from an Eastern manufacturer stating that the price of planers would be advanced on January 14.

Local engineers report that many projects for power plants and new factories are under way. While none of these projects has advanced far enough to be made public, some of them are likely to materialize early in the year.

Steps are being taken for the formation of a company to erect a new plant in Canton for the manufacture of an improved street car gear. The gear was patented by Samuel Smith and Andrew Hollinger of Canton. They have tested it on cars in Cleveland and say that it has given entire satisfaction. The gear is made of forged steel.

The Ohio Ceramic Engineering Company is erecting an addition to the car department of its plant on Berea road. The building will be one story, 90 x 105 ft., and will cost about \$6000. The company is rushed with business, having recently received some large orders for cars for ore and coal mines and brickyards.

The Johnson & Jennings Company is erecting an addition to its foundry and machine shop, and also a second story addition to its office building. The factory addition will be 33 x 60 ft. and one story high.

The W. S. Tyler Company is building a large one-story machine shop, which will be finished within 60 days. The company has put a large crane in the new building, and will add other machinery which will be built at its own plant. The company reports a big demand at present for wire cloth for screens, and that its ornamental iron department has all the orders that it can attend to.

The Ajax Mfg. Company is receiving many orders for its No. 9 Bulldozer, a forging machine of recent design, used for very heavy car work by railroads and in car factories.

The Cleveland Wire Spring Company is rushed with orders, and is somewhat behind with deliveries. The company is taking orders for delivery up to July. Customers, as a rule, have no surplus stock, and want immediate delivery. Prices of springs are advancing.

The National Cash Register Company, Dayton, Ohio, the

past week contracted through Strong, Carlisle & Hammond of Cleveland for about \$22,000 of machinery. The order includes 20 Brown & Sharpe screw machines and 76 Allen drills.

The Horsburgh & Scott Company is running its plant night and day to keep up its orders for gear wheels that are coming in at a lively rate from machinery manufacturers. This company has recently put in several new gear cutters and has ordered others which are on the way.

The Chisholm & Moore Mfg. Company has just booked an order for 20 of its largest sizes of new Cyclone chain hoists. This company is full of work in its malleable iron department, and has contracts and orders for far into the coming year. In its chain hoist department the company is very busy, and has some difficulty in making prompt shipments.

The G. H. Williams Company is building a derrick and buckets for a 3000-ton lighter that is being built by the Great Lakes Towing Company at Buffalo. The same company has designed and is putting in the machinery for a coal plant that is being erected by the Diamond Crystal Salt Company at St. Clair, Mich. The company reports a very active demand for coal and ore buckets.

The Acme Machinery Company is enjoying a good foreign business and has recently received some good orders for bolt and nut machines from Japan, Australia and Argentine. The company is rushed with business and is running its plant 12 hr. a day to keep up with its orders. The capacity of the plant has been increased one-third the past year.

The Canton Engineering & Electric Company, Canton, capitalized at \$15,000, has been incorporated by Robert G. Vincent, Elmer E. Miller, Philip E. Moock, W. E. Gordon and Joseph M. Linerode.

The Brown Hoisting Machinery Company is erecting for the Pennsylvania & Lake Erie Dock Company at Fairport, Ohio, six Fast plants, similar to those now in operation on the docks of the Pittsburgh & Conneaut Dock Company at Conneaut, the Toledo & Ohio Central Railway at Toledo and the Pennsylvania Company at Buffalo. The same company is also building four machines of this type for the New York, Pennsylvania & Ohio Dock Company, Cleveland, and three for the New York Central & Hudson River Railroad at Buffalo, N. Y.

The Cleveland Pneumatic Tool Company will build an addition in the spring, and intends to double the capacity of its plant in a few months. The company has just put in its own power plant, a compressor, lathes, new milling machines, two boring mills and four Cleveland automatic screw machines. The company is now in the market for two 24-in. vertical boring mills and a vertical cylinder grinder.

The Penn Shovel Company, Warren, and the Hanna & Young Handle Company of Poplar Bluff, Mo., have consolidated. The new company will erect a mill in Warren for the manufacture of steel and iron used in the shovel business, with an output of 50 tons a day. A modern two-story skelp mill will be provided in a building 75 x 360 ft. Contracts for the engines, boilers and other machinery will be let soon. The shovel factory will be enlarged, so as to increase its output to 75,000 or 80,000 dozen a year. The company expects to roll considerable steel for the trade. The Penn Shovel Company has increased its capital stock by \$200,000.

### Government Purchases.

WASHINGTON, D. C., December 18, 1906.

Many changes have been made in the form of the contract for the completion of the Panama Canal, the most important of which is the limiting of the proposals to American companies, thus barring foreign contractors. The proposals will be opened on January 12.

The Isthmian Canal Commission will soon purchase four Scotch marine boilers for barges on the Colon division of the canal.

The following bids were opened December 11 for supplies for the navy yards:

Bidder 19, Edwin E. Barlett, Boston, Mass.; 21, F. S. Banks & Co., New York; 23, The Bridgeman Bros. Company, Philadelphia, Pa.; 33, The George F. Blake Mfg. Company, New York; 35, The Crocker-Wheeler Company, Ampere, N. J.; 38, The Chicago Pneumatic Tool Company, New York; 40, The Cleveland Pneumatic Tool Company, Cleveland, O.; 44, The Case Mfg. Company, Columbus, O.; 49, The Compressed Air Machinery Company, San Francisco, Cal.; 68, M. T. Davidson, Brooklyn, N. Y.; 95, The General Electric Company, Schenectady, N. Y.; 98, Harron, Rickard & McCone, San Francisco, Cal.; 104, Hadwin Houghton, New York; 105, Henshaw, Bulkley & Co., San Francisco, Cal.; 112, The Handlan-Buck Mfg. Company, St. Louis, Mo.; 116, The Ingersoll-Rand Company, New York; 117, The Independent Pneumatic Tool Company, Chicago, Ill.; 134, The Landis Machine Company, Waynesboro, Pa.; 145, Montgomery & Co., New York; 161, The National Electric Supply Company, Washington, D. C.; 164, The Niles-Bement-Pond Company, New York; 178, The S. Obermayer Company, Cincinnati, Ohio; 181, Pawling & Harnischfeger, Milwaukee, Wis.; 186, The Porter Company,

New York; 189, The Pacific Tool & Supply Company, San Francisco, Cal.; 190, The Pittsburgh Pneumatic Company, New York; 200, The P. H. & F. M. Roots Company, New York; 239, The B. F. Sturtevant Company, Hyde Park, Mass.; 303, The Drew Machinery Agency, Manchester, N. H.; 320, Manning, Maxwell & Moore, New York.

#### Schedule No. 245.

Class 1. One electric traveling hoist—Bidder 44, \$600; 98, \$1067; 112, \$787.50; 164, \$675; 181, \$975.

Class 2. One rotary blower—Bidder 105, \$2110 and \$2230; 178, \$3000; 200, \$2310, \$1170 and \$2583; 239, \$2130.

#### Schedule No. 246.

Class 11. One belt driven shaper—Bidder 49, \$1000; 98, \$552.38 and \$877.50; 105, \$915; 164, \$885; 189, \$725.

Class 12. One belt driven pipe cutting and threading machine—Bidder 98, \$216.50 and \$737; 105, \$720 and \$780; 112, \$745; 164, \$697; 303, \$802.

Class 13. One belt driven pipe cutting and threading machine—Bidder 98, \$515.77 and \$1056.27; 105, \$720 and \$810; 112, \$1055; 164, \$785; 189, \$825; 303, \$830 and \$1082.

Class 14. One combination belt driven radial drill—Bidder 49, \$1064; 98, \$819; 189, \$925.

Class 15. One heavy pattern upright drill—Bidder 49, \$245; 98, \$202; 189, \$190.

Class 16. One 24-in. screw cutting engine lathe—Bidder 49, \$1200; 98, \$1352; 105, \$1250; 104, \$1528 and \$1274; 186, \$1450.

Class 17. One bolt cutter—Bidder 98, \$338.80; 105, \$315; 112, \$335; 134, \$440; 186, \$325; 303, \$333.

Class 18. One wet tool grinder—Bidder 98, \$237.90; 105, \$249; 112, \$250.

Class 19. One standard open side planer—Bidder 105, \$6927 and \$7020.

#### Schedule No. 284.

Class 138. One 35-hp. motor—Bidder 23, \$101.25; 35, \$721.50; 95, \$625; 161, \$500; 320, \$832.

Class 142. Two pneumatic riveting hammers and two pneumatic chipping hammers—Bidder 38, \$180 and \$200; 40, \$220; 116, \$269; 117, \$197; 190, \$270.

Class 143. Six pneumatic air drills—Bidder 38, \$280 and \$330; 116, \$360 and \$410; 117, \$318.50.

#### Schedule No. 285.

Class 205. One pipe bending machine—Bidder 38, \$125; 112, \$135.

Class 206. One power hack saw—Bidder 16, \$135; 43, \$96.

#### Schedule No. 286.

Class 278. Three Greenard arbor presses—Bidder 19, \$104.02; 145, \$116; 303, \$64.25; 320, \$101.30.

Class 278½. Two portable pipe bending machines—Bidder 38, \$250; 112, \$302.

Class 284. Two boiler feed pumps—Bidder 21, \$120; 33, \$82; 68, \$288; 303, \$87.

**Contract for Jones & Laughlin Furnaces.**—The Riter-Conley Mfg. Company, Pittsburgh, has received a contract from the Jones & Laughlin Steel Company, Pittsburgh, for the building of four blast furnaces at its new plant at Aliquippa, Pa. These furnaces will be 22 x 85 ft., and there will be 16 hot blast fire brick stoves of the Kennedy-Cooper design, each 22 x 100 ft. The furnaces will be of the most modern construction, including skip hoist and sealing arrangement for receiving materials and charging the furnaces. It is expected that two of the stacks will be ready for operation about July and the other two will follow later. The Riter-Conley Company is also building four blast furnaces for the Indiana Steel Company at Gary, Ind., each 22 x 85 ft. These furnaces are pretty well along, over half of the steel plate work having been already delivered.

The Harlan & Hollingsworth Corporation, Wilmington, Del., launched successfully, December 15, the steamship Delaware, building for the Clyde Line's Philadelphia and New York daily service. The vessel is 267 ft. long, 40 ft. beam, and will have a carrying capacity of 1800 tons cargo. Triple expansion engines will furnish the power, and the contract speed will be 12 knots per hour.

The plant of the Diamond State Steel Company, Wilmington, Del., was sold at auction on Tuesday for \$575,000. It was bid in by James B. Newkirk & Co., Philadelphia, who represent a syndicate of stockholders of the company.

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# HARDWARE

**M**OST of the advances announced within the past few months have been justified as necessary, on the ground of the increased cost of the goods owing to the higher prices ruling for material and wages. An instance is, however, brought to our attention of an advance in goods for an entirely different reason. The manufacturer frankly explains that it has been ascertained that the article in question has heretofore been manufactured at an actual loss, the impression being conveyed that only at this late day was the fact discovered. There is the suggestion here of the lack of correct business methods in the factory and of ignorance on the part of the manufacturer of the real cost of his product. A pathetic picture is thus presented—a manufacturer making strenuous efforts and taxing his ingenuity to find a market for his product when the more he sells of it the poorer he becomes.

The Hardware merchant is perpetually harassed by customers who demand a discount from regular trade prices. Formerly it was a common custom to differentiate between types of customers. To-day the practice still exists in many places, for various local reasons. Competition, with the absence of organization among the merchants, naturally develops this irregularity in prices. Sometimes, too, merchants have not reached the point where they feel like making a radical change from a usage which has been gradually established in their relations with customers. The tendency of to-day, however, is to put all customers on the same basis as to price, the only exception being where genuine reciprocal relations exist. An illustration of the modern practice has been brought to our attention as having occurred in one day's business of a large retail Hardware establishment. A customer asked a discount on a gun. He was one who made goods for the establishment, giving the lowest trade prices, and the merchant granted his request, dividing the profit on the gun. His reason for violating his rule was that this customer did the same for him. Shortly before this occurred a contractor called, also to buy a gun, and asked a discount. It was refused. There were no existing reciprocal relations between him and the merchant. The fact that as a contractor he had influence in placing Hardware business trade was put aside.

The Hardware merchant does not get a wide margin of profit on his sales. Take for instance the trim of a house. In the old days when such a bill of goods was made up each article was reckoned at its individual price. One might command a profit of 25 per cent., another 12 per cent., yet another 40 per cent., and perhaps a fourth 125 per cent., which used to be quite possible. The customer paid the total of the prices. To-day the same bill is made up in a lump sum. Everything is figured in at cost and a fixed percentage added for profit, perhaps 15 per cent. The aggregate profit is much less than under the old system. A discount custom would rob the merchant of much of the profit which goes to making his living and whatever he can secure above that amount in yearly income.

When merchants get together such matters can be regulated. If every Hardware man in a city or town agreed to eliminate the trade discount to favored customers there would be some little friction, but it would soon be over and little thought would be given to the days when the favored ones saved a few dollars annually by getting something which others could not get. Other lines of retail trade suffer seriously by the existence of the discount practice. The dry goods merchants have this as one of the problems to solve, because they have not been able to get away from their much abused discount to dressmakers. There is some excuse in their case, because they have not been able to unite for mutual protection, and until they do there can be little advance from some of the old methods of doing business. The Hardware merchant has himself and his associates in business in the same community to blame if he suffers from this class of income reducing customs, for a local association should enable the merchants to put an end to this troublesome and inequitable practice.

## Condition of Trade.

The attention of the trade has been called so frequently to the advances taking place in Hardware that it is scarcely necessary to refer to the strength of the market which characterizes the closing days of the year. Notwithstanding the fact that the great majority of goods in the Hardware line have already been advanced, announcements are from day to day being made in regard to higher prices on articles which have not moved in sympathy with the upward trend of things. There is also a good deal of attention being given by manufacturers to a revision of their prices, with the prospect that the new year will start on a generally higher level than did 1906. General trade shows little trace of the relaxation which usually marks the end of the year. Traveling men are homeward bound and retail merchants are fully occupied with holiday sales. It is the time when distributing forces are wont to pause and take breath, clean up odds and ends and cast up accounts preparatory to entering upon inventory and another business year. As in the past vacation season, however, the expected slackening is not apparent, although it would be welcome in many quarters. Orders continue to flow steadily in. One prominent manufacturer's agent states that his business for the first two weeks of December was approximately equal to that of the entire month last year. Another well-known house reports orders for the half month almost up to those of October, in which all records were broken. In such conditions manufacturers are afforded little opportunity to accumulate stocks, and indeed it is asserted that many goods are as hard to get as they have been at any time. The present year promises to mark the "farthest north" for Hardware merchants in cultivating Christmas trade. The commendable movement toward taking advantage of the season's opportunities is gaining momentum, and is fortunately furthered by the general well being which increases the consumption of fancy goods and luxuries. We congratulate our readers on this fact, as well as on the general prosperity, of which we trust they have been permitted to reap an ample share, and extend to one and all a hearty Christmas greeting.

**Chicago.**

With the approach of the mid-year inventory period both jobbers and manufacturers are beginning to call in their representatives, and there will be little activity in the trade until after the first of the year. Reports from retail merchants indicate that the holiday demand is unprecedentedly large and that sales of the better grades of goods are greater than ever before. This is undoubtedly due to the prosperous condition of the country, as other lines as well as Hardware are similarly affected. The inclement weather which is prevailing throughout the Northwest has put an end to all outdoor building operations and the decline in consumption is already felt. Throughout this district, however, weather conditions have been favorable to outside work and the demand for all classes of Builders' Hardware is almost as heavy as during the summer months. Although the retail trade from the jobbers' and manufacturers' standpoint is quiet, distributors are keenly alive to their future requirements and are buying freely in the heavier lines. Shortage of material resulting in deferred shipments and inadequate transportation facilities have temporarily changed conditions in the trade, and to guard against depleted stocks heavier purchases for future wants than have heretofore been customary have to be made. The present month promises to show a fair increase over December of last year on the books of the leading jobbers, although the increment will probably not be as great as was recorded by some of the more active months of this year.

**Cleveland.**

**THE W. BINGHAM COMPANY.**—In 1869, we believe, the Hon. William H. Seward, Secretary of State at one time under President Abraham Lincoln, made the following prophetic remark, in a speech that he delivered in defense of the purchase of Alaska from Russia by the United States Government: "The Pacific Ocean, its shores, its islands and the vast regions beyond, will become the chief theater of events in the world's great hereafter."

Did any one at that time believe that Seward's prophecy would come true so soon? Certainly history will record many startling events that have transpired and will transpire in reference to these regions. In addition to the United States shore of the Pacific, there has been added of late years the Hawaiian, Philippine and other Pacific Ocean islands, all of which are under the protecting arm of Uncle Sam. Now just stop and think what a large amount of our products will be needed to feed, clothe, house and make the inhabitants thereof comfortable and happy. It is expected very soon that Porto Rico will come under Uncle Sam's charge, and perhaps in the near future Cuba. Then when the great work of building the Panama Canal is finished and our Government has control of subsidized shipping to this shore and islands mentioned, and especially to the shores of the South American continent, what is there to prevent the prosperity in all lines of American business from continuing indefinitely?

There is at present a very active trade in all branches of business. It is not so much a question of price to the buyer, as it is ability of the jobber to furnish the goods promptly. Goods are not being stored away in large quantities, but are actually being consumed in a large measure.

Every man and woman that is able and willing to work can find employment at good wages; in fact, scarcity of good, honest labor is one of the problems of to-day. There are enough people in the country, but there is a lack of brains to do the work properly and expeditiously. So many people are in a hurry to get rich quick (the shortest way) that skilled labor is at a premium. If the present generation of young men and women were more willing to serve their time of apprenticeship and learn the trades that they are working at thoroughly it would not be long before there would be plenty of competent help at good wages and in permanent positions. What manufacturers and merchants are after is people with brains and not merely brawn. People who use their brains properly are the ones who will get to the

front the quickest. Broad-minded, brainy salesmen are in evidence in many trades, and they are the kind that grow and are happy and prosperous and a blessing to the community in which they operate, to the customers that they visit and the houses they represent, and are ornaments in any society. There is also a large army of so-called salesmen, who are simply price makers. These fellows, however, will find their level sooner or later, and will have to go back to the farm and follow the plow or get on the end of a street car, as that is more to their size and ability.

Holiday goods are very much in evidence in all orders now in a large variety.

Have you bought your Screen Wire Cloth, Poultry Netting, Nails and Wire for spring use? If not do so at once, as the indications are that there will be a scarcity. Buy now and do not wait for lower prices or better terms, or you may be very much disappointed.

May a Merry Christmas and a Happy and Prosperous New Year be the lot of all of our people.

**Louisville.**

**BELKNAP HARDWARE & MFG. COMPANY.**—The general market continues to show unabated activity. All of the sources of supply are embarrassed apparently for material and transportation, at least they are slow in turning out ample product, and it looks as though, notwithstanding contracts made far ahead, we shall enter in upon the new year short of goods.

The railroads are as busy as they can be, and fail to secure equipment fast enough for the present needs of shippers, notwithstanding the unusual efforts they have made to provide cars and motive power. The tracks are crowded with freight trains as closely as they are with passenger trains in the excursion season, and as a consequence we have had an unusual number of disastrous accidents.

Many of the freight train collisions are never reported outside of the immediate locality. These frequently result in the demolition of two engines just at the time when they are most needed. If we could put a stop to the accidents we might have some chance of catching up with the car equipment. According to the writer's observation, the equipment is ahead of the track laying and ballasting branch in maintenance of way. In many places the sidings will have to be materially lengthened; short distances double tracked, and all of it well ballasted, where now after each rain sleepers repose like huge alligators in their muddy beds. The terrific weight and centrifugal force exerted on these slippery sliding ties result not infrequently in spreading rails and overturned cars and locomotives.

The passenger accident which has attracted more widespread attention than any other was that on the Southern, which resulted in the death of its admirable president, Mr. Spencer. He was well known in this community, and liked and admired by every one who knew him. One point in the discussion of the cause of this accident has not received the attention that it is entitled to—namely, whether when the train stopped the brakeman or flagman was prompt and quick in his duty to flag the rear end of the train. It has often been the subject of observation and remark that this is one of the duties which seems to be most shirked of any of those connected with the conduct of a passenger train. Whether the brakeman is afraid of being left, or whether he dislikes to make the exertion of scurrying to the rear it is not exactly clear, but certain it is that that should be the first thing done when the train stops in an out of the way place. All the blocks and systems that have ever been devised have not done away with the necessary factor of personal vigilance. Had the brakeman on President Spencer's train been immediate in his action with his warning signals that frightful and distressing accident need never have occurred.

**St. Paul.**

**FARWELL, OZMUN, KIRK & Co.**—Business conditions are very much as expected at this season. The year's trade is closing and during next week the salesmen will be in and the year's business will practically be finished.

About the usual conditions of this season now prevail. The only large disturbing feature that specially affects the Northwest now is the congestion of the railroads and the great shortage of cars, as well as to some extent the shortage of rolling stock. This condition has become greatly aggravated now that winter is here, owing to the very limited supply of coal and wood throughout Minnesota and the Dakotas. The question of fuel will probably be a prominent one for several weeks to come. The railroads are making a strenuous effort to supply the actual needs and it is probable that very little actual suffering will result, but, nevertheless, the situation is not at all comfortable.

Another result of the congestion of the railroads is the great difficulty and, in fact, impossibility of getting sufficient cars to move grain and other produce to market. It is not an unusual occurrence for a station on one of our lines of road to be able to secure only one, two or three cars during a week to carry the grain to market. As a result of this condition collections are somewhat slow and must continue so until relief from the railroads is afforded.

In other respects business conditions are good and the prospects for the first half of the coming year are generally of a satisfactory character.

#### Portland, Oregon.

**FAILING, HAINES & McCALMAN.**—At present all jobbing houses in this territory are busy taking inventory and closing up the year's business. Although there has been quite a falling off in business since this time last month, it has not been as great as usual and came much later than usual. It seems that the demand for Hardware increases rather than diminishes in this territory, and the trouble will be, as last year, to get the goods.

At present the fault lies not so much with the manufacturer as with the railroads. This territory is suffering from a car shortage. The railroads have not sufficient cars to supply the demand and they have not enough locomotives to move the cars they have got. The cars are at times a week or two in covering a 200-mile stretch, but business holds up well in the face of this adverse condition, which affects not only the jobbers in getting their goods and the retailers in getting theirs, but all manufacturers and producers in delivering goods. The lumber trade is more easily affected than any other, but all agricultural interests are suffering from inability to move crops.

It may possibly be a blessing in disguise, for if all conditions had continued favorable we do not see how any of us could have handled the business that would have come to him. We have all been as busy as we possibly could be, even under these adverse conditions. We hope in the course of the next few months the railroads will get straightened down before any really serious damage is done to trade. With the exception of this car shortage and lack of motive power, if it should continue far into next year, we see no prospect of anything that would prevent the coming year being far busier and more prosperous and better in every way than the remarkable year which is just closing.

#### St. Louis.

**NORVELL-SHAPLEIGH HARDWARE COMPANY.**—1906 passes. It has been a good year, full of pleasant and cheerful activity from a strong beginning to a strong finish.

Now comes the time of stock taking. The question will be up before all of us as to whether advances shall be taken in stock, either all or in part. The danger of taking all of an advance is that declines may take place the coming year, and then the good showing of this year may be offset by a poor showing next year.

We have decided to cast an anchor to windward by not taking all of the advances; we will make our mistake on the side of conservatism. This has been a good year; we do not need the advances to help out. We may need these advances next year. A profit is never made until the goods are sold. We would also advise our friends and customers to take the conservative side of this question.

This will be our last report this year. We extend our holiday greetings to the entire Hardware trade—to manufacturers, to jobbers and to retail dealers, and last, but not least, to the officers and employees of *The Iron Age*.

#### Philadelphia.

**SUPPLEE HARDWARE COMPANY.**—The story of local conditions, if written, would seem like the synopsis of previous chapters of a continued story and would require the use of more exclamation points and bolder type. The commercial ship is sailing on new and unexplored seas. The man on the bridge can no longer guide his boat by the landmarks of the past, nor take his reckoning from precedent and precept of the charts which have guided his ship in the years that are past.

The present year in most commercial houses has broken all previous records, and we are beginning to hear, instead of the pessimistic question of how long this prosperity will last, the new and strange query of how much more of this prosperity can we stand. What is going to be the result of the continued demand upon our factories so far beyond their utmost capacity? Where are manufacturers and business men to draw their supplies of raw and skilled labor from? As an illustration of the difficulty of obtaining anything like satisfactory working men we instance an Eastern Hardware manufacturing company which has this year increased its permanent force by 600, but only after having employed over 4000 men, from whom the above number were sifted.

Those in charge of details of the jobbing business today are meeting with questions from their force on all sides that puzzle the best of them to answer. How are we going to get time to take stock? Where are we going to put the carloads of stuff that are coming in after the first of the year? It has been a long time since the selling price was as little questioned. The merchant now seems to be chiefly anxious to know that the jobber has the goods to ship and will be able to make deliveries on time.

We are glad, however, to note the approach of a day when we can and should banish, as far as possible, the perplexities of commerce and give heed to those more enduring things of love and friendship which cluster about the Yuletide. We take this occasion, and count it a privilege, to extend to the members of the Hardware fraternity our wish for a very merry Christmas and a happy and prosperous New Year.

#### NOTES ON PRICES.

**Wire Nails.**—There is little let up of pressure upon the mills, as new business is being received in good volume and specifications on contract orders are large. Stocks, both in the hands of jobbers and at the mills, are lighter than usual. Output is restricted by shortage of Steel and shipments are delayed by lack of transportation facilities. Some in the trade are of the opinion that it will be a scramble to get Nails within 30 days, and there are those who would not be surprised at a further advance in prices. The market is firm. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers.....	\$2.00
Carload lots, to retail merchants.....	2.05

**New York.**—Local demand is somewhat light, but is keeping up very well considering the season and the inclement weather, which has been largely in evidence during the week. Prices are being very well maintained. New York quotations are on the following basis: To retailers, carloads, on dock, \$2.19; less than carloads, on dock, \$2.33; small lots, at store, \$2.30.

**Chicago.**—Although the volume of new tonnage booked during the past week for all classes of Wire products has not been as heavy as during the first week of the month, nevertheless, the total is indicative of a continued heavy consumption, and reflects the depleted stocks in jobbers' warehouses. Never before in the history of the trade have mill stocks of Nails been so low as at present, and insistent demands for prompt shipment prevents accumulations. Shipments are still being prorated, notwith-

standing the season and the inclement weather, which in the Northwest, at least, has stopped all outdoor building operations. Production is still curtailed by the Steel shortage and shipments are delayed by inadequate transportation facilities. Quotations are unchanged, as follows: \$2.15 in car lots to jobbers, and \$2.20 in car lots to retailers, with an advance of 5 cents for less than car lots from mills.

**Pittsburgh.**—In spite of the lateness of the season, demand for Wire Nails is quite active, and shipments by the mills in November, while not as large as in October, were heavy. Stocks at the mills and in the hands of jobbers are much lighter than usual at this season. The continued scarcity of Steel is operating against the mills in getting out maximum output. Independent Wire Nail mills that have to buy Rods in the open market find it almost impossible to get these, the price being \$38, and in some cases higher. In fact, Rods are higher in price now and harder to obtain than for several years. Specifications on contracts for Wire Nails placed before the recent advances in prices are coming in very freely. The market is firm, and it is stated that all new business being entered is at the full official prices. Quotations are as follows, f.o.b. Pittsburgh, plus actual freight to point of delivery, 60 days, or 2 per cent. discount for cash in 10 days:

Carloads, to jobbers.....	\$2.00
Carload lots, to retail merchants.....	2.05

**Cut Nails.**—There will be no meeting of the Cut Nail Association during the present month, but an automatic advance in price and for the same amount will take place if higher prices are made on Wire Nails. Some mills have booked orders for their entire output for at least 30 days, and others are reported to be sold up still further ahead. Specifications are being received in good volume, while there is a fair amount of new business. Quotations are as follows, f.o.b. Pittsburgh: Carload lots, to jobbers, \$2.05; less than carloads, to jobbers, \$2.10; less than carloads, to retailers, \$2.20. Iron Cut Nails at points west of Buffalo and Pittsburgh are held at 10 cents advance on Steel Cut Nails.

**New York.**—Local jobbers are not receiving shipments of Cut Nails from mill with any degree of promptness, as manufacturers are still far behind their orders. This is not regarded by jobbers as a particular hardship at present, as demand is somewhat light. New York quotations are generally maintained on the basis of \$2.30 for small lots at store.

**Chicago.**—The withdrawal of several Eastern mills that have sold their entire output for the next three months and the closing of another mill until February for repairs will greatly curtail the source of Nail supply for this market during the next 60 days at least, and Chicago quotations have already been sharply advanced. Jobbers' stocks are low, and in view of the continued heavy demand their replenishment is not anticipated until after spring requirements are met. We revise quotations as follows: Iron Cut Nails, car lots, to jobbers, \$2.30; to retailers, \$2.35; Steel, to jobbers, in car lots, \$2.20; to retailers, \$2.25.

**Pittsburgh.**—There is a fair demand for Cut Nails, but not so heavy as some time ago. The mills have a good many contracts on their books on which specifications are coming in quite freely. There is some irregularity in prices of Cut Nails among the smaller trade, which has Nails on hand, bought at lower prices than are now ruling. The general market, however, is quite firm and we quote as follows, f.o.b. Pittsburgh: Carload lots, to jobbers, \$2.05; less than carloads, to jobbers, \$2.10; less than carloads, to retailers, \$2.20. Iron Cut Nails at points west of Buffalo and Pittsburgh are held at 10 cents advance on Steel Cut Nails.

**Barb Wire.**—Jobbers are placing orders earlier than usual, so as to provide for spring demand, as scarcity of Steel and car shortage may delay shipments to some extent. Specifications on contracts are being received in good volume by the mills. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots.....	\$2.15	\$2.45
Retailers, carload lots.....	2.20	2.50
Retailers, less than carload lots.....	2.30	2.60

**Chicago.**—Large distributors are buying freely to cover 60-day requirements, and there is every indication that they are endeavoring to accumulate stocks for the spring trade. The movement from jobbers' stocks is practically at an end, as consumption is very light, and retailers will not buy heavily until after the first of the year. We quote \$2 f.o.b. Chicago, in car lots; retailers, \$2.05.

**Pittsburgh.**—Orders are now being placed with the mills for spring delivery and a good deal of tonnage is being entered. The scarcity of Steel and shortage in cars may delay deliveries and the trade is placing orders for spring shipment earlier this year than usual. Specifications on contracts are coming in very freely and the market is firm, the recent advanced prices being well sustained. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Gal.
Jobbers, carload lots.....	\$2.15	\$2.45
Retailers, carload lots.....	2.20	2.50
Retailers, less than carload lots.....	2.30	2.60

**Smooth Fence Wire.**—New business is being received by the mills in small volume, as large requirements have already been covered by contract orders previously placed. Specifications are coming in freely and mills are from 30 to 60 days behind on deliveries. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....	\$1.85
Retailers, carloads.....	1.90

The foregoing prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12	13	14	15	16
Annealed.....Base.	\$0.05	.10	.15	.25	.35	.45	.55	
Galvanized.....	\$0.30	.35	.40	.45	.55	.65	1.05	1.15

**Chicago.**—Shipments have improved materially, but on certain gauges deliveries are still deferred from 30 to 60 days. New tonnage is very light, as all the large consumers are covered on contracts closed during the summer months. Specifications, however, show no decline and are in excess of production. Prices are unchanged as follows: To jobbers, Chicago, car lots, Painted, \$2.30; Galvanized, \$2.60; to retailers, car lots, Painted, \$2.35; Galvanized, \$2.65; to retailers, less than car lots, Painted, \$2.45; Galvanized, \$2.75; Staples, bright, in car lots, \$2.25; Galvanized, \$2.55; car lots to retailers, 10 cents extra, with an additional 5 cents for less than car lots.

**Pittsburgh.**—Manufacturers of Wire Fence are specifying heavily on contracts placed before the recent advances in prices, and shipments by the mills are large and deliveries are from four to six weeks behind. Most of the large trade covered their requirements prior to the recent advance and will not be affected by the higher prices. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....	\$1.85
Retailers, carloads.....	1.90

The foregoing prices are for base numbers, 6 to 9.

**Sheet Zinc.**—The advance in Zinc announced on December 7 and reported in our last issue has been followed by a further advance made under date of December 15. This brings the base price up to \$8.25 per 100 lb. in 600-lb. casks of the thicknesses from Nos. 9 to 22, inclusive, and of the widths from 32 to 58 in., inclusive, and of the lengths from 72 to 96 in., inclusive. There are the usual extras for other sizes and numbers and the usual discounts, as follows:

	Cash with order.	Quantity.	Total.
	Per cent.	Per cent.	Per cent.
Carload lots.....	3	5	8
9000-lb. lots.....	3	3	6
6000-lb. lots.....	3	2	5
3000-lb. lots.....	3	1	4
Less than 3000 lb.....	3	0	3

**Galvanized Ware.**—The market for Galvanized Ware, which has shown sustained strength throughout the fall

season, has again developed an upward tendency, manufacturers' quotations showing a slight advance during the past week. Jobbers who were heavy buyers of these goods some months ago have been freely selling at prices as low as or lower than the extreme figures of the manufacturers. As their stocks have become depleted, however, the jobbers' quotations have also hardened and may now be said to be fairly commensurate with the discounts of the manufacturers. We give below the lists on Galvanized Pails and Tubs now in general use, although net prices are still being made to the retail trade in many sections. From these lists a discount of 10 and 5 per cent. is readily obtainable, with some further concession to larger buyers:

Buckets, Galvanized.				
Quart .....	10	12	14	16
Water, Regular, per gross.....	\$25.35	\$28.00	\$32.00	\$40.00
Water, Heavy, per gross.....	43.35	48.00	52.00	60.00
Fire, Rd. Bottom, per gross.....	32.00	34.65	38.65	....
Well, per gross.....	37.35	41.35	45.35	....

Tubs, Galvanized.				
No. ....	0	1	2	3
Per gross.....	\$64.00	\$76.00	\$84.00	\$96.00

**Coal Hods.**—While Coal Hods, including galvanized and japanned lines, are not strictly in the same category as Galvanized Buckets and Tubs, the market for these goods is fairly covered by the above report. The discount of 10 and 5 per cent. and the concessions referred to may be similarly applied to the following list:

Coal Hods.				
Inch .....	15	16	17	18
Galvanized, Open, per gross.....	\$35.00	\$39.00	\$42.00	\$46.00
Japanned, Open, per gross.....	26.00	28.00	31.00	35.00
Galvanized, Funnel, per gross.....	43.00	48.00	53.00	56.00
Japanned, Funnel, per gross.....	33.00	36.00	39.00	43.00

**Wood Planes.**—All quotations on Wood Bench Planes have been withdrawn by several prominent manufacturers and new base discounts have been announced representing considerable advances on these lines. The change is attributed to the growing scarcity of suitable lumber and the increased cost of this and other raw material. The new base discounts, on which an additional 10 per cent. may readily be obtained by good retail trade, are as follows:

Wood Bench Planes, first quality.....	30%
Wood Bench Planes, second quality.....	40%
Fancy or Molding Planes.....	25%

**Tinware.**—Prices on Stamped and Pieced Tinware, etc., have moved up slightly during the past week, the change approximating 5 per cent. All manufacturers report an exceptional volume of business for this season and there is much difficulty in supplying the staple articles and grades as called for.

**Troy Nickel Works.**—Troy Nickel Works, Albany, N. Y., announce that owing to the advance in the cost of labor and raw material entering into the construction of Alaska Stove Trimmings and Hardware Specialties present prices will be withdrawn December 20. New prices will be furnished on application.

**Bench and Hand Screws.**—The leading manufacturers of Wood Bench and Hand Screws have advanced their quotations, making the base discount 20 per cent. instead of 25 per cent., which has been the ruling base up to this time. The new level of the market may be fairly represented by a discount to retail trade of 20 to 20 and 10 per cent.

**Copper Wire.**—Copper Wire on December 15 advanced in price to 25 cents per pound, base, in sympathy with the recent increase in the price of ingot copper, the previous base having been 24½ cents per pound. These prices contemplate large quantities, such as are usually taken by the electrical companies.

**Soldering Coppers.**—Owing to the continued advance of Ingot Copper there are some increases in Copper products, the base on Soldering Coppers having been advanced to 28 cents per pound on December 15, in lots of 300 lb. and over, with the customary extras for lots smaller than 300 lb.

**Coil Chain.**—An advance has been made in smaller sizes of Proof Coil Chain, which have been selling lower than they should in proportion to other sizes and in view of the cost to manufacture. The changes are as follows:

3-16 in.....	advance 25 cents per 100 lb.
¼ in.....	advance 20 cents per 100 lb.
5-16 in.....	advance 15 cents per 100 lb.
¾ in.....	advance 15 cents per 100 lb.
7-16 in.....	advance 10 cents per 100 lb.

**Handled Hammers.**—A general advance in prices has just been made by several manufacturers of Nail, Blacksmiths', Hand, Riveting Hammers, &c. The change amounts to about 5 per cent.

**Wood Bench Screws.**—Under date of December 12 the following revised list on Wood Bench Screws is announced. It is subject, as was the old list, to a discount of 20 per cent.:

	Price per dozen.
Wood Bench Screw, V Thread, 2-in.....	\$4.50
Wood Bench Screw, V Thread, 2½-in.....	4.75
Wood Bench Screw, V Thread, 2¾-in.....	5.00
Wood Bench Screw, V Thread, 2½-in., with patent groove and patent metallic vise flange.....	5.00
<i>Wood Tail Screws.</i>	
Wood Tail Screw, V Thread, 2-in.....	\$12.00
Wood Tail Screw, V Thread, 2½-in.....	12.00
Wood Tail Screw, V Thread, 2½-in., with patent groove and patent metallic vise flange.....	12.00

<i>Bowers' Pattern Bevel Thread Bench Screws.</i>	
Wood Bench Screw, 2½-in.....	\$7.00
Wood Bench Screw, 2½-in., with patent groove and patent metallic vise flange.....	7.00

<i>Square Thread Bench Screws.</i>	
Wood Bench Screw, 2½-in.....	\$7.00

**Plane Irons.**—The manufacturers of Plane Irons have adopted a new and higher list, which is subject to the same discounts as the old list. The revised list, which bears date, December 12, is as follows, subject to the general discount of 25 per cent.:

<i>No. 253. Plane Irons, Single or Out, Without Caps.</i>										
Size, inches.....	1½	1¾	1¾	1¾	2	2¼	2¼	2¾	2¾	2¾
Per dozen.....	\$2.50	2.75	2.75	2.95	3.15	3.35	3.70	4.10	4.50	4.50
Size, inches.....	2¾	2¾	3	3	3	3	3	3	3	3
Per dozen.....	\$4.90	5.50	5.50	7.00	7.00	7.00	7.00	7.00	7.00	7.00

<i>No. 254. Plane Irons, Double.</i>										
Size, inches.....	1½	1¾	1¾	1¾	2	2¼	2¼	2¾	2¾	2¾
Per dozen.....	\$5.50	6.00	6.00	6.25	6.45	6.65	7.00	7.40	8.20	8.20
Size, inches.....	2¾	2¾	3	3	3	3	3	3	3	3
Per dozen.....	\$9.00	10.15	11.70	7.15	7.15	7.15	7.15	7.15	7.15	7.15

<i>No. 262. Tooth Plane Irons.</i>				
Size, inches.....	1¾	2	2¼	2¼
Per dozen.....	\$4.95	\$5.15	\$5.35	\$5.70

**A. Buch's Sons Company.**—A. Buch's Sons Company, Elizabethtown, Pa., has withdrawn all quotations on Cast Iron Goods and also Steel Goods, and will quote revised prices on application.

**Rope.**—The various qualities of mixed Manila Rope, of which there are a number of grades on the market, are having somewhat of a demoralizing effect upon prices, as far as mixed goods are concerned. High grade Manila Rope is very firm, owing to the strong position of the best grades of Manila Hemp. Second quality of Sisal Rope is firmer at present quotations. Demand is lighter for all Rope, and not much of a pronounced revival of business is anticipated by manufacturers before the first or middle of February. New York quotations are as follows: Pure Manila, 12½ to 13 cents; B quality, 11½ to 12 cents; Pure Sisal, 9¼ cents; No. 2 quality, 8 cents; No. 1 Jute, ¼ in. and up, 8¼ to 8½ cents; No. 2 Jute, 7¼ to 8 cents per pound.

**Window Glass.**—It is understood that the orders placed by the Eastern and Western Jobbers' associations with the National Brokerage Company amounted to 600,000 boxes. The Eastern Association offered the American Window Glass Company an order for a large quantity of Glass at the same terms and under the same conditions as governed the order placed with the Brokerage Company. As the American Company was not willing to agree to terms and conditions they declined the order, but are reported as desiring to work in harmony with the Brokerage Company in not demoralizing the market. The jobbers who placed the order, exclusive of sash and door manufacturers, are said to distribute fully 90 per cent. of the Window Glass made in this country, and that outside of the Brokerage Company there are only about 400 hand operated pot capacity. Many of the latter are referred to as having disposed of their output for the fire, while others are said to have con-

tracted for the sale of their product for two or three months in advance. The market thus appears to be in a position to have prices maintained. Local jobbers are quite busy, which is usually the case at this season. Jobbers' quotations, from jobbers' list, October 1, 1903, are as follows: Greater New York, 90 and 10 per cent. discount for all sizes, single and double strength; outside of Greater New York, 90 and 5 for single and 90 and 10 per cent. discount for double strength Glass.

**Linseed Oil.**—The closing of navigation has not resulted in the falling off in the price of seed, as was anticipated by some, while on the other hand it has continued to advance. Demand is light in the local market, as immediate requirements are small, and large buyers see no inducements to place contract orders at present figures. Available supplies in this market are somewhat limited owing to the congested condition in freight in transportation. New York quotations are as follows, according to quantity: City Raw, 42 to 43 cents per gallon; out of town Raw, 41 to 42 cents per gallon. Boiled Oil is 1 cent per gallon over Raw.

**Spirits Turpentine.**—The market has held firm at this point in sympathy with free buying at Savannah. Local demand is limited as buyers are keeping stocks down until after the first of the year. New York quotations are as follows, according to quantity: Oil Barrels, 70 to 70½ cents; Machine Made Barrels, 70½ to 71 cents per gallon.

#### DEATH OF SAMUEL DODD.

**SAMUEL DODD**, president of the International Silver Company, died suddenly at Meriden, Conn., December 12, aged 72 years. He had been to the office of the company as usual, and soon afterward while reading passed away. Heart disease was the cause of death. Mr. Dodd was born at Hartford, Conn., October 4, 1834, the son of Samuel Dodd. He came of old and distinguished New England stock. He was educated in the public schools of Hartford, and began his business career as a clerk in a large drug establishment with which he remained for a number of years. He went to Meriden in 1857 as cashier of the Home Bank, which office he filled until 1867, when he entered the manufacturing business, being an organizer of the business of the Parker & Casper Company, manufacturer of Silverware. The company was later merged into the Wilcox Silver Plate Company, of which Mr. Dodd was the secretary and treasurer until the business was absorbed as a part of the International Silver Company in 1898. He was made the president of the International Company, and retained the office until his death. Under his management the business greatly increased and its products were diversified by the addition of new lines. He always retained his connection with the Home Bank as a director, and was secretary and treasurer of both the Meriden Gas Light Company and the Meriden Electric Company. He was a director of Manning, Bowman & Co. and of the E. W. Bliss Company. He had served in the General Assembly of Connecticut, representing Meriden. He was for many years a vestryman of St. Andrew's Episcopal Church. He married Catherine Brooks, who died 18 years ago. A son, Charles T. Dodd, is the only surviving member of the family.

THE case of the Inland Empire Implement and Hardware Dealers' Association versus the Spaulding Mfg. Company, having reference to the legality of the association's methods to prevent sales of implements and vehicles by peddlers in the territory covered by the association, (eastern Washington and Idaho) was recently argued before the United States Circuit Court of Appeals at San Francisco, but decision has not yet been rendered. It is expected shortly after the first of the year. It will be remembered that an injunction against the association was obtained by the Spaulding Company some months since, which injunction was made permanent by Judge Whitson of the United States Federal Court for the eastern district of Washington. The Inland Empire Association appealed the case to the United States Circuit Court as above.

#### STEEL GOODS ADVERTISING CAMPAIGN.

**A**ERICAN FORK & HOE COMPANY, Cleveland, Ohio, is inaugurating a campaign of publicity which has attracted attention in the trade. The plan, which embraces several original features as applied to the line of goods made by this company, is undertaken with the object of stimulating general interest in Hand, Farm and Garden Tools. By advertisements in leading agricultural publications and by the free distribution of a book entitled "Tools and Their Uses" it is proposed to make the public better acquainted with these lines. The book will contain valuable information, which has never before been compiled in similar form, illustrating and describing the purposes of hundreds of desirable hand Tools. A feature of importance is the information which will be given in regard to special Tools for field and garden work, while the advantages of using correctly shaped, properly tempered and reliable Tools for all purposes will be emphasized. In entering upon this aggressive campaign the company proposes to raise the standard of its manufacturing, improving all its first quality brands wherever possible. Hereafter all Tools complying with the new standard will be designated "True Temper" Tools, and at the various factories this brand will be applied in addition to the labels now familiar to the trade. While the company's output is sold entirely through jobbers, it is believed that retail merchants will be directly assisted by the advertising of the company.

#### DEATH OF CLEMENS VONNEGUT, SR.

**CLEMENS VONNEGUT, SR.**, pioneer Hardware merchant of Indianapolis, Ind., died December 12 of pneumonia, aged 82 years. He was born in Muenster, Westphalia, Germany. He came to America in 1851, when he was 27 years old. Shortly afterward he engaged in business in Indianapolis with an old friend who had settled there. They conducted a general store, and a few years later, in 1857, Mr. Vonnegut was in business for himself, handling Hardware, leather and findings. In 1868 he closed out his leather stock and confined his trade thereafter to Hardware. As his sons, Clemens, Bernard, Franklin and George, arrived at majority they were taken in as partners, and 10 years ago Mr. Vonnegut retired and left the business in their hands. In 1898 the name Vonnegut Hardware Company was adopted, and one of the finest retail Hardware stores in the West was built.

A DECISION was rendered December 17 in the suit brought by Yale & Towne Mfg. Company against Benjamin S. Alder as representative of E. T. Fraim. This suit was for the purpose of preventing the manufacture and sale of a certain Padlock made by E. T. Fraim which was so close an imitation of one made by the complainant that it was claimed to constitute unfair competition. The case was tried in the United States Circuit Court for the Eastern District of New York, before Justice Thomas, who denied the application of the complainant and rendered a decision in favor of the defendant. We are advised by Yale & Towne Mfg. Company that the case will be appealed.

THE W. M. RITTER LUMBER COMPANY, with headquarters at Columbus, Ohio, has secured the services of L. Scott Little who, at the close of the year, will sever his connection with the Champion Division of the International Harvester Company at Springfield, Ohio, where he has been engaged for the past seven years, latterly in charge of the company's general and lumber yards and the unloading of cars. Mr. Little is familiar with the lumber business from stump to the consumer, and will be identified with the operating department of the Ritter Company whose mill operations reach into the Virginias, Carolinas, Tennessee and elsewhere.

HARVEY CHAPMAN having sold his half interest in the firm of H. Chapman & Co., Stafford Springs, Conn., wholesale and retail hardware, paints, oils, agricultural implements, grass seeds, sash, doors and blinds, mill supplies and sporting goods, the business will be continued as formerly by C. E. Brown and C. C. Pinney under the name of Brown & Pinney.

## A Hardwareman's Pamphlet on Retail Mail Order Competition.

"THE Retail Mail Order Question" is the title of an interesting pamphlet which has lately been circulated among his patrons and others in the territory from which his trade is drawn by F. P. Rutherford, for 25 years in the Hardware and furniture business at Houston, Mo. In an introductory the reader is frankly reminded that the matter as prepared is an advertisement of the author's business, but notwithstanding the declaration is made that the pamphlet "should be read by every one who is interested in the upbuilding of Texas County," in which Houston is situated. In view of the attractive and clean cut way in which Mr. Rutherford presents the subject we reproduce below practically all he has to say:

Do you remember the "sight unseen" trade or "swaps" of boyhood? One of the parties to the transaction usually got the worst of it, didn't he? And it wasn't usually the one who proposed the deal, was it? There's a lot of the same sort of "sight unseen" trading going on to-day, only nowadays it is called buying by mail.

Do you not feel like there is something wrong when a firm guarantees an \$11 Sewing Machine for 20 years? What does a guarantee amount to when you do not even know what company makes the machine? What are you going to do in a few years when you send to the city store for repairs for your crippled orphan and receive the reply that it has quit the Sewing Machine business or that the factory that made the Machine has failed? Will you sue for damages, employing an attorney in Chicago or St. Louis to recover \$11?

### You See the Goods.

When you trade with me or any local merchant you see the goods before you pay for them and know precisely what you are getting. When you buy from a catalogue house you judge of the quality of an article from the picture of it, and many of you have been sorely disappointed when you received the goods.

When you trade with us you have no freight, express charges or boxes to pay for. You get at home such quantity as your needs require. You get the goods when you need them. You get first-class goods at actual value. You see the goods before you pay for them.

### A Horse Sale Comparison.

How many of you would think of buying a horse from a catalogue with a cut of an animal with a name under it? Of course the catalogue would say that the horse was a bright bay, weight 1200 lb., and so many hands high, free from blemishes and offered at the cut price of \$78.96 because of a spot cash deal with a prominent stock farm. There is as much reason in a purchase of that nature as there is for you to buy carpet from a certain catalogue house at the cut price of 29 cents per yard in Chicago when you can get a better grade of carpet from me for 30 cents per yard and see what you are getting before you pay for it. This "money back if goods do not suit you" looks good, but if a list of those who took what they did not want rather than admit they had been swindled were printed it would include every one who does business with the catalogue house.

### What Mail Order Houses Will Not Do.

No mail order house helped to build the little white schoolhouse over on the hill, or turnpike the road past your door. No mail order house ever took you by the hand when you were in distress and told you to let that little account go until after harvest next year. No mail order house ever sold you a wagon and spent every cent of its profits right in the community where you and your neighbors could get it all back again. No mail order house ever shoved its patent leather shoes under your table and rejoiced with you when you were glad, or spoke encouraging words of affection, or stood with uncovered head besides the grave when your children died.

### Texas County Receives No Benefit.

No, the mail order house is after money. Every dollar it gets its hands on will be jerked out of Texas County forever. The mail order house may bear upon its face the semblance of friendship, but no human heart beats under its cloak of hypocrisy. Sentiment to it is unknown. The whole institution is as cold and bloodless as a corpse. All the mail order houses in Christendom would not increase the value of your farm 1 cent. They are parasites to whom life is only possible as long as they can suck the blood out of the communities, to the upbuilding of which they contribute nothing. They create no local market for the products you have for sale. They have no property in

our county which can be assessed to help bear your burden of taxation.

Your local dealer needs neither advocate or defense. His methods rest upon principles that have been built up in this country—a system of internal commerce which is the marvel and admiration of the world. His business is legitimate because its success contributes to the general prosperity of the community that built it up. I stand ready to duplicate every offer so seductively set forth in the catalogues of mail order houses, and more.

### I Will Trump the Best Trick

the mail order house ever played if you will put down spot cash and accept from me a class of goods devoid of respectable ancestry, and upon which no reputable manufacturer will place his name. I can sell cheap goods, too, if you will buy them from me with your eyes shut. I can meet the best price ever made by a mail order house if you will plank down the money and accept what I give you without question and without recourse.

Honestly, now, don't you pat yourself on the back when you spend your money in such a way that in supplying your own wants you help build up the neighborhood in which you live? Of course you do, and you act on that idea yourself, but you don't talk it to your neighbors. Stand by us local merchants as we stand by you with our time, our skill and our money. We help to build up the community and we make it a better place for us all to live. Our own success depends upon your prosperity. We have no use for mavericks—unbranded junk. We swear by the goods branded with the trademark of the most skillful manufacturers on earth—goods like no other generation ever saw—and we have an abiding faith in the theory that the best vehicles in the world to-day are none too good for that major-general of all the industries—the American citizen.

### When Times Are Dull What Happens?

It is an unfortunate fact, as well as showing the absence of any sense of right and justice, that a great many people seem to regard their local stores as though they were established merely for accommodation. When these people have cash to spend it goes to the mail order house, but when times are dull, when they are out of work, or during the season when farmers are not turning their produce into cash, what do they do? Do they write to the mail order house and ask for a little time for a favor? If they do they fail to get it. How many farms have been paid for by your local merchants advancing both the goods necessary to keep life in the body and cash to meet that dreaded interest on the mortgage? You should think of these things.

### Right on the Spot.

There is so much difference between buying goods at a home place of business and ordering them by mail from a catalogue house, from a mere picture or description, that we want to point out to you a few facts that you may have never even thought of. Here you go into a store and make your wants known; the salesman shows you the desired article, and if necessary helps select or suggests to you the article best suited to you. Right here you have a chance to examine the quality, to see the style, to select the size and color, as the case may be; you can compare the different qualities, &c., and then, if all is satisfactory, and in your judgment the price right, you will make the purchase. When you get home and upon a rigid examination you find a flaw or crack in your purchase, or may be it is too large or small, or a blue instead of a black, then the next day, or a week after, you go to town to your Mr. Dealer, who will gladly exchange the items or refund your money.

### Not What You Expected.

On the other hand, you order an article by mail. You look through the catalogue; the item is there (that is, a picture and a smoothly written description). We know that the picture of a \$5 suit looks as good as the one for \$20. You read the description; it seems to be what you want; you send the money because they want the money with your order. You can order the goods on inspection by sending part in money, balance C. O. D., but there is usually so much inconvenience in refusing a shipment that nine times out of ten you will accept the goods, though they are not what you expected to get. When the article comes it is not what you expected; it may not fit or something is broken or has a flaw in it. If Mr. Catalogue Man was right there you would not accept it, but he is so far away; he has your money. He says he will send money back, but rather than go to all that trouble you accept the shipment.

### How Good Catalogue House Profits Are Secured.

They will take a well-known brand of Shot Gun and offer it at \$25. This Gun they describe with a few lines, with a small cut or picture of it. Next they will use a page with a large cut of their own brand of Gun, and

what they don't say about this Gun is not worth saying. This wonderful Gun they price at \$19.37 and, according to description, the Gun is worth a great deal more. The reader orders the \$19.37 Gun, on which the supply house makes a profit of 50 per cent., while if he had ordered the \$25 Gun they would not make 5 per cent.; but listing a well-known brand at a cheap price establishes confidence and helps them gain their point to sell their own brand at a big profit. It would set city people wild if these supply houses actually had values with style and quality. They would not need to leave their own large cities to sell at the prices they quote, as the people would go wild over their bargains.

But with style and value lacking they dare not show their goods in the city, where the prospective customer would have the opportunity for comparison, but by cleverly worded and exaggerated description they make people in the country and towns believe they are offering more desirable wares than the country merchant keeps at less price, and having no opportunity for comparison before buying, many people are duped.

#### True Citizenship.

When you are in need, and deserve it, your home merchant will help you out. He helps to keep up the schools and churches. He contributes his share for roads, &c. Where there is need for a special fund he usually heads the list; when there is a picnic or fair for church or society he is usually there; that is why we say you get more than the mere goods from your home dealer. Another thing, you probably have a family—some time one of your sons may think of going into business for himself. Where is there a chance for the young man with a limited capital to ever become a merchant when the people send their money to build up these gigantic corporations to compete with your son or your son's son. True citizenship is not all in rallying around the Star Spangled Banner of our country and singing "Hail Columbia."

The spirit of true patriotism is shown by the man who patronizes home industry first, last and all the time. It is quite amusing to read the smooth talk they use in their catalogues to deceive the readers to send their orders.

They say that goods are sent in plain packages because many merchants who buy of them to sell again object to have their name appear on the boxes, &c. I want to tell you that I honestly believe that not a single merchant in this United States has ever ordered any goods from these concerns. He cannot buy from them and stay in business. The statement is made to make you, Mr. Reader, believe that you can buy as cheap as your local merchant. Now be honest yourself; buy at home; help support your own town. Make your own homes more valuable. Put dollars in your purse. Let Mr. Humbug sell in his own town. Instead of his fooling you, you fool him by trading at home.

#### Good Goods Just as Cheap in Houston.

I know that it is a fact that many articles are priced in these catalogues cheaper than you can find in my store or any other store. Have you ever thought of the reason why that is? It is not because I cannot get these goods and sell them to you at just as low prices, but it is because I am afraid to sell you articles that have no merit, because you can reach me daily and except me to make it good, because you expect to get goods of satisfactory quality or I may lose your trade. I am your personal friend, and I am afraid to sell you goods I cannot recommend. If I had never seen you or expected to, and was several hundred miles away and got the money first, I would be in a different position. Remember, I don't want to say that you can't get good goods from these concerns, for I know you can; but these better grades cost you as much and more than they do at the stores in Houston.

#### If Home Trade Were Ruined?

There is still one more thing to bear in mind and which I think a serious one. Supposing the mail order houses could sell goods cheaper and everybody would order their goods from them. The local stores would soon be no more; you would then be obliged to send for everything. Remember, a store cannot be kept up with the small purchases if the money is sent away for the big things. You have then succeeded in ruining your home trade; you have then helped to build up an enormous corporation in some far away city. Your home consumption and market would decrease the value of your farms, or houses would get less valuable, as you well know. You know if a town goes back the value of it and surroundings decrease. Send your money away, you get nothing but the goods; spend it at home and it will come back to you in better towns, better stores, better schools, better churches and better social advantages. Is not the building up of your county seat more to you than building up of some far away city? Is it not a fact that if our town had 10,000 population instead of 750 it would be better for us all? Would there not be much more employment; would not these people consume more products and con-

sequently make a better market; would not the small homes with one lot be doubled in value and every farm within the radius of 30 miles be worth from \$5 to \$50 an acre more? Then is it only a good thing for the merchant or tradesman if you buy of him? Is it not just as good a thing for you?

#### Don't Forget It.

Every dollar spent in Texas County is a Texas County dollar. Don't forget it. Every dollar spent away is a dollar lost to Texas County. Don't forget it. Texas County dollars mean Texas County prosperity. Don't forget it. Texas County prosperity is our business. It is up to us. Don't forget it. The catalogue houses never returned a dollar to Texas County. Don't forget it. A catalogue house never fixed a road or built a bridge in Texas County. Don't forget it. A catalogue house never built a building or paid a cent of taxes in Texas County. Don't forget it. Everybody knows who is building up Texas County with good old Texas County dollars; and who is building up some other county with Texas County dollars—it cannot be kept a secret. Don't forget it.

The remaining pages of the pamphlet are devoted to the illustration and description, with prices, of selections from Mr. Rutherford's stock, the last page containing a comparison of his prices on different goods with those charged by the mail order houses.

#### AN INDIANA MERCHANT'S VIEW.

Robert St. Clair, Veedersburg, Ind., also has something to say on the subject of the competition of the retail catalogue house. In a four-page pamphlet entitled "Short Talks on Long Subjects," and having special reference to goods that come in appropriately as Christmas gifts, the following paragraphs appear addressed to "Dear Reader":

If you happen to be one of those who are in the habit of sending to Chicago for goods that you could buy at home no doubt you will feel like talking back. I want to ask you if you think that by sending your orders for goods to Chicago to such an extent that it will eventually cripple the home merchant and put him out of business, you would really be benefited? Do you suppose that if there were no stores in the small towns (which will be the logical result of such actions continued) that you would still buy at the low prices that you do now? May be you would, but we doubt it.

#### Which Side Are You Fighting On?

Do you realize that a kind of war is on, with competition upon one side and monopoly on the other? Two rich corporations in Chicago who have made their fortunes within a dozen years are aiming by fair means or foul, if necessary, to put your local merchant out of business. I say foul, because in their catalogues they misrepresent their goods. They misrepresent the fair dealing home merchant. Their catalogues and small package goods are carried to the distant States at a loss to the mail service of the country and they are still seeking further advantage in this particular by the enactment of what is called the parcels post law. Which side are you fighting on? Do you think that two stores in Chicago where you cannot buy less than 50 cents' worth at a time, and who keep your money while you wait, are better than 50 stores at home who deliver to your door 5 cents' worth and wait from 30 to 365 days for their pay?

#### Ready to Meet Prices.

In regard to prices quoted in the catalogues, we would say that we have given the leading catalogues a good deal of attention in the last year and we find that upon goods that come in our line we stand ready and willing, in fact, anxious to furnish to you any standard goods of known brands and numbers at the same price that the catalogue house offers them with the freight added, providing you accept the same terms and conditions that they set forth in their catalogues. However, we wish to say that we are not aiming this for an attack upon catalogue houses, nor do we feel that they have hurt our business to any great extent, the fact being that we undersell them in very many instances.

THE CRUCIBLE STEEL COMPANY of America has opened a branch house at 20 Hygeia street, Worcester, Mass., where it purposes carrying a stock of its standard brands of tempering tool steels as well as a full stock of Rex A. High Speed Steel. E. F. Moody, who is well known in that section of the country, will have charge as manager.

THE large Hardware store of J. F. Wiley at Graysville, Pa., has been completely destroyed by fire. The loss was about \$12,000, on which there was insurance amounting to \$5000.

## RETAIL IMPLEMENT MERCHANTS IN CONVENTION.

THE eighth annual convention of the Retail Implement Dealers' Association of South Dakota, Southwestern Minnesota and Northwestern Iowa, at Sioux Falls, S. D., was called to order at 8:30 o'clock on Tuesday evening, December 11, by O. E. Mesick, Gettysburg, vice-president of the association, in the absence of L. V. Schneider, Salem, president, who was too ill to attend the convention. The delegates were welcomed on behalf of Sioux Falls by City Attorney C. P. Bates, who made the address of welcome as the representative of Mayor Pillsbury, who was out of the city. C. E. Hamren welcomed the delegates on behalf of the Sioux Falls Implement and Vehicle Jobbers' Association. J. E. McDougall, Britton, made a response to the addresses of welcome on behalf of the members of the association.

J. A. Craig, Janesville, Wis., then addressed the convention as the representative of the National Association of Implement and Vehicle Manufacturers. Mr. Craig was followed by C. W. McDonald, Council Bluffs, Iowa, whose subject was the traveling man. With the appointment of Committees on Resolutions, Nominations and Auditing, the first session was brought to a close.

### Report of the Secretary.

Wednesday's session was called to order at 2 p. m., the first business on the programme being the annual report of W. S. Hill, secretary of the association, from which we make the following extracts:

I find much of encouragement to report at this annual convention. Our membership has not increased the past year, but I think this the result of the radical advance in annual dues which took effect this year. The interest, however, in real association work increases with each year. Our association is each year gaining in the confidence of the manufacturers, retailers and consumers. All are more fully realizing as time passes that we are not banded together for the purpose of regulating prices in any manner, but for the discussion of legitimate trade topics that will better enable us to carry on our line of trade.

### Mutual Insurance.

The matter of securing safe insurance at as reasonable rates as possible is one that affects all dealers. On account of our association having membership in three different States, it has seemed impracticable for us to organize a mutual insurance feature in connection with our association. The dealers of South Dakota have been able heretofore to get their insurance carried in the different merchant mutual companies. There seems to be a tendency on the part of such companies in some cases to change their plan entirely, and others are endeavoring to get away from the strictly mutual idea. An insurance company that would require all policyholders to have a membership in our association would be of great help in holding our members together year after year.

### Canvasser Question.

The question of using canvassers sent to us by manufacturers is one of the vital things to be considered by the dealers. This is a matter that vitally concerns the dealers' future. Here are some of the phases it presents that seem to be of great importance:

1. What effect will the continued use of the canvasser have upon our future independence?
2. Is it desirable to have any one, not an employee, to be on the "inside" of our business prospects?
3. What effect will the use of canvassers have upon the cost of goods?
4. If it will increase the cost, are we treating our customers fairly by continuing such custom?

The above and other questions about the canvasser system should be considered by the dealers at this time.

Upon an open market and freedom to buy whatever line the dealer desires rest the independence and future welfare of the implement dealer.

### Complaints.

During the year a considerable number of complaints have been filed. I am glad to report that almost without exception these have been satisfactorily settled. There are at this time practically no complaints of importance pending. In the settlement of differences, the Grievance Committee has endeavored to show a spirit of fairness, and has generally been met in a like manner. We have not insisted so much upon the payment of commissions

in the settlement of irregular sales as we have in establishing a proper basis for the future.

### Association Finances.

Mr. Hill, who is also treasurer of the association, then presented his report of the finances of the organization, showing that during the past year receipts were \$536.06, and disbursements \$473.90, leaving a balance on hand, December 10, of \$62.16.

Mr. Hill followed with a report as delegate to the meeting of the National Federation of Implement Dealers' Associations.

### Reciprocal Insurance.

The matter of reciprocal insurance was then taken up for discussion. It was found that about one-half the delegates favored this form of insurance, while some others preferred that the association should organize its own company. It was finally decided that those of the members of the association who desired reciprocal insurance should give their names to Secretary Hill, who would forward them to the headquarters of the insurance company in Kansas City, Mo., from whom application blanks would be sent to those desiring to take out policies. This course was decided upon as the best under the circumstances, it being understood that the insurance could only be secured by members of the association.

### Local Organization.

Chairman Mesick then made an address on "Local Organization." The keynote of his address was the motto, "United We Stand, Divided We Fall." He pointed out that without local organization merchants made war on each other, arousing jealousy, cutting prices, &c. He urged the formation of such associations with meetings at frequent intervals. Once a month was not too often. These local bodies would also aid in building up the State Association. "Get together," he concluded, "instead of pulling each other down, and you'll be happier and make more money."

Chris. Johnson, Centerville, told of such an organization, which embraced the dealers of Centerville and towns in the vicinity. It was organized about a year ago and already had accomplished wonders in creating a better feeling among the dealers of that part of the State. "We found we were not such bad fellows after all when we finally got together," said Mr. Johnson. The members have oyster suppers and banquets and otherwise enjoy themselves, creating the best of feeling. The dealers are now making more money than formerly.

### South Dakota Travelers' Association.

Fred. J. Vetsch of Sioux City read a paper prepared by F. C. Kile, Watertown, who was called away from the convention before his paper was reached in the proceedings. Mr. Kile represented the South Dakota Traveling Men's Association, and his paper dealt with the work of that organization, which, he said, was more than anxious and willing to work hand in hand with the South Dakota Implement men to the end that trade conditions, which affected both merchants and salesmen may be bettered. The travelers' association is now a little over two years old. At the first annual convention held at Watertown in June, 1905, there were 492 members in good standing. At the second annual convention, held at Aberdeen last June, the roll of members in good standing had increased to 1048.

### Dues Now \$3 a Year.

The final session of the convention was held on Thursday morning, when a number of matters were disposed of. Secretary Hill introduced an amendment to the constitution reducing the annual membership dues from \$5 to \$3. On motion the amendment was adopted without a dissenting vote. The amendment will take effect the first of the coming year. The fee originally was \$3, but was raised for the purpose of giving the association more revenue. The financial affairs of the association are now in good condition. It is thought the reduction will result in securing many new members.

On motion the president was given authority to appoint delegates to represent the association at the conventions of other State associations.

**Resolutions.**

The Committee on Resolutions reported the following among others which were adopted:

*Resolved*, That this association most heartily approves the position that the National Federation of Implement Dealers' associations has taken in needed business reforms and we would commend their work of the past year, especially in their successful efforts in obtaining from the Wagon manufacturers so favorable a warranty, which should be satisfactory to all concerned. And we appreciate the honor of having one of our members, M. D. Thompson, on the Executive Board.

*Resolved*, That it would be to the interest of the retailer if shippers would acknowledge receipt of all orders and state as nearly as possible when shipments will be made. Also that copies of bills of lading be immediately mailed to consignees.

*Resolved*, That this association disapproves of the practice of manufacturers sending canvassers into our territory. We believe that the canvasser lowers the standing of the dealer with his customer, and destroys his independence in dealing with the manufacturer; that the expense of canvassers must add materially to the cost of goods, and we would ask the manufacturer to discontinue canvassers and give us the benefit by lowering their prices.

*Resolved*, That this association use all honorable means to prevent the passage of a bill known as the Parcels Post bill, and that each member be requested to use his influence with our Senators and Representatives in Congress toward its defeat.

*Resolved*, That it is the sense of this convention that the present commission allowed by manufacturers on repairs is not sufficient, and we indorse the change asked for by the National Federation of Implement Dealers' Associations.

**Election of Officers.**

The following officers were elected for the ensuing year:

PRESIDENT.—O. E. Mesick, Gettysburg.

VICE-PRESIDENT.—J. E. McDougall, Britton.

SECRETARY-TREASURER.—W. S. Hill, Alexandria.

DIRECTORS: F. V. Campbell, Redfield; George Waskey, Madison.

LEGISLATIVE COMMITTEE: E. F. Gross, Gettysburg; J. H. Roper, Parker; C. Rempfer, Parkston; C. J. Johnson, Centerville; B. E. Lee, Watertown; Robt. Smith, Worthington, Minn.; W. H. Thomsen, Round Lake, Minn.; F. A. Folsom, Spirit Lake, Iowa; W. H. Beacon, Sheldon, Iowa.

GRIEVANCE COMMITTEE: W. S. Hill, Alexandria; E. B. Van Alstine, Mitchell; E. C. Barton, Vermillion.

December 10, 11 and 12, 1907, was chosen as the time for the next convention. The place was not selected, this matter being left to the decision of the Executive Committee.

**TRADE WINNING METHODS.**

*This department is for the description of approved methods of carrying on and extending business, and a cordial invitation is given to merchants to co-operate in the effort to make it suggestive and of practical use to the trade.*

**CHRISTMAS BOOKLETS, BULLETINS, &c.**

IN accordance with its annual custom for some years, the Phillip Gross Hardware Company, Milwaukee, Wis., has issued a Christmas booklet which this year bears the suggestive title, "Just in Time for Christmas." It is gotten up with the exceptional skill and taste which has characterized this company's booklets in the past. The front cover design, in colors, depicts a uniformed messenger in the act of delivering a Christmas package at the door of a palatial residence, while the frontispiece inside the booklet presents a view of a sumptuously furnished library with the young woman recipient contemplating with evident pleasure and appreciation the beautiful gift, which has been stripped of its covering with unusual celerity, as the messenger can still be seen through the window retracing his steps from the house. The booklet contains 16 pages, and is elegantly printed on a fine quality of paper. Well executed illustrations occupying a good proportion of each page and acting as a sort of partial border to the text relate to the special holiday lines to which the pamphlet is devoted, including Cutlery, Table Silverware, Household Utensils, Sporting Goods and Tools. The reader is reminded, however, at the end of the booklet's story, that "many things of gift interest" are "still untold," suggesting that a visit to the

store will unfold a multitude of others just as useful and pleasing. The motto, "If it's from Gross it's good," is given conspicuous attention in the booklet.

The John E. Bassett & Co., New Haven, Conn., has issued its "New Haven Almanack for the year 1907" in the same quaint style and make-up which characterized the "almanack" distributed to the patrons of the store last year, several pages of which were reproduced in our columns. The booklet contains a calendar of days and months, together with "certain old-time pictures, with some historical facts and many pertinent observations." The matter thus interestingly set forth comes with special appropriateness from the Bassett Company, which dates back to Revolutionary days, the business having received its start in 1784. It is familiarly known as "Ye Olde Harde-Ware Store," but modern methods have developed the business into one of the largest and most successful in its field in the State. The last page of the booklet contains a selected list of articles suitable for Christmas giving.

The Christmas booklet of the Barrett Hardware Company, Joliet, Ill., carries the title, "Christmas Suggestions, 1906." It is attractively printed in two colors, green and black, the illustrations being in the former color and appearing in connection with and forming a background for the text in black. Santa Claus is suggested by the design on the front cover, which represents a fireplace and mantel, the latter supporting an assortment of stockings which have not yet received attention from the world famous philanthropist. Throughout the booklet the fact is emphasized that the Barrett Hardware store is "The Store of Practical Gifts," and to substantiate this declaration attention is effectively called to a number of articles and lines, with illustrations and prices. These include Nickel Plated Ware, Shears and Scissors, Tool Boxes, Pocket Cutlery, Carvers, Razors, Enameled Ware, Food Choppers, Wagons and Sleds, Bread Makers, Coffee Percolators, Ranges, Washing Machines, Clothes Wringers, Carpet Sweepers, Skates, &c.

John Mackey & Son, South Haven, Mich., have inaugurated the publication of a Hardware bulletin devoted to the interests of the store, with a Christmas number which is well printed and directs attention to quite an assortment of goods well adapted for selection as holiday gifts. The Christmas thought is pictorially suggested on the first page, the principals being Santa Claus and a little toddler who has called up the genial saint on the telephone, to make known his requirements for the proper observance of the day. The last page of the bulletin contains a coupon, which upon being filled out and mailed or brought to the Mackey store will entitle the party named to a copy of the firm's 1907 calendar.

J. M. Davis & Sons, Oakland, Md., who for some months have been publishing a store paper under the style of *The Hardware Bulletin*, have issued a December number, which has been made larger and more interesting than usual, to serve the purpose of a Christmas edition. It comprises 48 pages and contains a number of special articles copiously illustrated on subjects of much local interest, including one by J. M. Davis, the veteran founder of the business, who writes entertainingly on the early days of Oakland as he remembers them and the many changes which have taken place. These articles are, of course, supplemented by matter having more direct relation with the business of the house, and the readers of the paper are reminded that the stock carried includes many articles which admirably answer the purpose of Christmas giving. The last page of *The Bulletin* contains a monthly calendar for 1907 and is embellished with an exterior view of the Davis establishment.

The Whitcomb-Carter Company, Beverly, Mass., has issued a card, about 7 x 9 in. in dimensions, on one side of which is a well executed engraving of Rafe's chasm at Magnolia, Mass. The other side, under the head of

"Christmas Suggestions," enumerates a large assortment of holiday goods, with prices.

## A NEWSPAPER ADVERTISING CAMPAIGN.

**G**EO. KRAUSE HARDWARE COMPANY, Lebanon, Pa., a long established and very successful house, has for some time been carrying on an aggressive advertising campaign through the medium of the newspapers,



## THAT YOU WOULD HELP US OUT

By beginning to make some of your Christmas purchases now at 35 South 8th Street. By so doing, you would help yourself, for you would have the best choice of goods while our stocks are full and fresh.

Here is a partial list of things you can look over and from which you can make a good choice of a gift for Father, Mother, Brother, Sister or Forty-second Cousin.

BASEBALL OUTFITS,	HAIR BRUSHES,
BLACKING CASES,	HAND MIRRORS,
BREAD MIXERS,	LAP BOARDS,
BOYS' AUTOMOBILES,	LAUNDRY SETS,
BOYS' WAGONS & CARTS,	FOUNTAIN PENS,
BOYS' WHEELBARROWS,	MANICURE SETS,
BOYS' VELOCIPEDES,	MATCH BOXES,
BOXING GLOVES,	POCKET KNIVES,
CARPET SWEEPERS,	PUNCHING BAGS,
CAKE MIXERS,	PING PONG SETS,
CARVING SETS,	RAZORS,
CHECKER BOARDS,	RAZOR STROPS,
CHESS SETS,	REVOLVERS,
COMPASSES,	ROGERS' SILVERWARE,
CROCKINOLE BOARDS,	SCISSORS,
COFFEE PERCOLATORS,	SEWING MACHINES,
DOG COLLARS,	SEWING TABLES,
ELECTRIC LAMPS,	SAFETY RAZORS,
FANCY PLAYING CARDS,	SHAVING BRUSHES,
FINE FISHING RODS,	SLEDs,
FINE BASKETS,	SKATES,
FOOD CHOPPERS,	TABLE KNIVES & FORKS,
FOOTBALLS,	TAPE MEASURES,
GO-CARTS,	TOOLS,
GAS LAMPS,	TOOL CHESTS,
GUNS,	WASHING MACHINES,
GUN CASES,	WINDOW MIRRORS.
HOBBY HORSES,	

**GEORGE KRAUSE HARDWARE CO.**  
The Good Luck Store

those published daily. The company's advertisement appears in three papers, a different announcement in each journal. The ads. are changed at least every three days, in some cases oftener. As a result of the company's enterprise in this direction an increase has been noted in the sales of some of the lines featured. More definite and substantial returns are expected later, when readers have formed the habit of looking for the ad. daily. The company has favored us with a budget of the advertisements thus inserted, several of which are reproduced herewith, reduced in size. Among the lines thus brought to the attention of the Lebanon public were Guns and Rifles and accessories, Sewing Machines, Washing Machines,

and, of course, Thanksgiving and holiday goods. A rule is made to accompany the announcements with illustrations, frequently of a pictorial but pertinent character. One of the ads. made special reference to the fact that the

**Only One Customer Now**  
to  
**Every 50th the Week Before Christmas**  
*BE SURE and start to make purchases while our stock is high and the goods are fresh*

**Advance Christmas Hints**

<b>For Father &amp; Bro.</b> Tool Chests .... \$1.25 to \$5.00 Pocket Knives .... 10c to \$4.00 Carving Sets .... 75c to \$9.00 Watches (guaranteed) .... \$1.00 Safety Razors .... \$1.00 to \$2.00 Revolvers .... \$2.00 to \$15.00 Shot Guns .... \$2.50 to \$40.00 Rifles .... \$2.50 to \$18.50 Match Boxes .... 25c to \$2.00 All kinds of Tools.	<b>For Mother &amp; Sister</b> Table Knives and Forks (set of six each) .... 50c to \$5.50 Nut Pickers .... Set, 15c up Scissors .... 25c to \$2.00 Manicure Files .... 10c to 80c Coffee Percolators .... \$3.50 to \$8 Bread Mixers .... \$1.50 to \$2.50 Food Choppers .... 50c "Bony Bodies" .... \$4.25 up
<b>For the Boy</b> Sleds .... 35c to \$7.00 Skates .... 50c to \$4.00 Boxing Gloves .... \$1.00 to \$5.00 Automobiles .... \$4.50 to \$12.00 Irish Mail .... \$5.00 Wagons .... 10c to \$18.00 Foot Balls .... \$1.00 to \$5.00 Punching Bags .... \$1.50 to \$10.00 Dog Collars .... 15c to \$2.00	<b>For the Girl</b> Sleds .... 35c to \$7.00 Skates .... 50c to \$4.00 Toy Go-Carts .... 35c to \$2.50 Toy Wringers .... 50c Toy Irons .... 10c to 50c Hand Mirrors .... \$1.50 to \$3.50 A full stock of Rogers' Silver Plated Ware

**George Krause Hardware Co.,**  
THE GOOD LUCK STORE  
35 SOUTH EIGHTH ST.

business will be 75 years old in 1908, but pains were taken to remind the readers that during all this period the house has kept up with the times, adapting its methods to new conditions as they presented themselves, so that while an old concern, business is done in the twentieth

**The Proud Turk**  
LOOKS GOOD THESE DAYS

**He'll Look Better**  
on the Table, Thanksgiving Day

**He'll Look Best**  
after a set of our carvers have worked on him.

The Great East Day is but two weeks off. We are showing an especially fine line of carvers this year.

**PRICES:**  
75c TO \$9.00

**Carvers**  
AT 26 S. EIGHTH STREET

**Carvers**  
AT 26 S. EIGHTH STREET

**GEORGE KRAUSE HARDWARE COMPANY**  
THE GOOD LUCK STORE

century style. Nearly all of the advertisements mentioned prices on the goods, giving the possible buyer an idea as to what was expected of him in case he desired to possess himself of what the company had to offer. The Krause concern carries an extensive and varied stock, which includes wares of the highest quality in different lines, as well as those making more modest demands on the purse. Frequent reference is made to the establishment as "The Good Luck Store," a name which the company tries to merit and live up to.

### I. E. PALMER'S CATALOGUE.

THE 1907 Hammock catalogue of I. E. Palmer, Middletown, Conn., New York office, 55 Worth street, has lately been issued. It is  $3\frac{1}{4} \times 6$  in. in size, and comprises 114 colored plates representing every pattern and design of Hammock. One Hammock and pattern in colors only is represented on a sheet, the illustration representing the entire Hammock. These plates are made of a size which admits of their being used in a regular letter envelope, and such leaves can be furnished in quantities for mail advertising. The leaves can also be used in making up special catalogues for jobbers representing only the line purchased, which is manifestly an advantage over the full and complete catalogue where a jobber only intends to run a limited line of patterns and colors. A new feature used in connection with Hammock Wood Bars is the patented tip, which is so shaped that the stringing of the Hammock when carelessly caught over the end of the bar will slide off and not catch and break. In hanging a Hammock it often happens that the stringing becomes caught over the ends of the wood bars, bringing all the strain on two or three outside cords of the stringing, which naturally are not strong enough to stand the full strain, and this causes them to break. The new patented feature will prevent this. Another patented device is the stringing of the end cords at both head and foot of the Hammock, being carried down into and through the spreader and fabric, thus strengthening the edges of the Hammock which usually give way first. All Hammocks are fitted with adjustable hitch end rings requiring no adjustable ropes nor knots. This feature does away with the necessity of using an anchor rope as these rings are made with a double eye which allows a jamming half-hitch to be taken in the Hammock end of the rope which is very easy to adjust.

### WISCONSIN IMPLEMENT CONVENTION.

THE Wisconsin Retail Implement and Vehicle Dealers' Association held its first annual convention at Milwaukee, December 12-14. The association was organized last April and has been growing at a very satisfactory rate, the meeting at Milwaukee having been attended by nearly 150 members. The association is in a way an outgrowth of the Wisconsin Retail Hardware Association and was organized in response to a general feeling that there were important business considerations which made a separate association of this character absolutely necessary. At the Milwaukee convention much consideration was given to the subject of combating the competition of mail order houses and means for counteracting the methods of some manufacturers and their canvassing system were suggested. At the close of the session resolutions were adopted opposing the proposed establishment in Wisconsin of a prison Bindery Twine plant and the Legislative Committee was instructed to oppose such a plant at the coming session of the Wisconsin Legislature. Resolutions were also adopted opposing the bill in Congress for the establishment of a parcels post, which would operate to the disadvantage of retail dealers. Formal resolutions were also passed opposing the canvassing system adopted by certain manufacturers and jobbers, and the association pledged itself to refuse assistance to such canvassers. The following officers were elected for the ensuing year: President, F. R. Sebenthal, Eau Claire; vice-president, D. W. Allaby, Mauston; secretary-treasurer, Chas. Schraeder, Markesan; Directors, J. H. Hayden, Sun Prairie and George Ewen, Antigo.

### LONDON HARDWARE CLUB.

A HARDWARE CLUB has recently been organized in London, England, membership in which is open to members of any British firm or the officers of companies in the United Kingdom engaged in the Hardware and allied trades, either manufacturing or distributing. Many influential firms in the London Hardware trade and a few in the Provinces are already identified with the club. Owing to the geographical distribution of the trade in

London it has not been found feasible to provide a central location for the club which could be used regularly for dining purposes, as is the case with the Hardware Club of New York. The principal objects of the club are as follows: For meeting from time to time upon neutral ground for discussing matters of interest concerning the trade, to deal with cases of insolvency and bankruptcy in which its members are concerned, so that by united action their interests may be safeguarded; and that where possible, when its members are interested in cases which are considered to be financially sound, but owing to certain circumstances are unable to meet their engagements within a reasonable period, united action be taken by those interested to investigate the position, and if this is satisfactory to help and support the debtor. Jas. Keeves of James Keeves & Sons, Shoreditch, E., London, is Hon. Secretary of the new club.

### PRICE-LISTS, CIRCULARS, &c.

*Manufacturers in Hardware and related lines are requested to send us copies of catalogues, price-lists, &c., for our catalogue department in New York; and at the same time to call attention to any new goods or additions to their lines, of which appropriate mention will be made, besides the brief reference to the catalogue or price-list in this column.*

C. T. HAM MFG. COMPANY, Rochester, N. Y.: 32-page illustrated catalogue of Ham's Cold Blast Automobile lamps, for which line John H. Graham Company, 113 Chambers street, New York, are selling agents for domestic and foreign trade. The assortment includes the Rochester, Tourist, Corona, Reliance, Aurora, Apex, Acme, Monitor and Vigilant Lamps, all of which have the Cold Blast principle.

CHARLES E. MILLER, 97-101 Reade street, New York: Pamphlet referring to a few Automobile Specialties in advance of the complete catalogue of this manufacturing, jobbing, exporting and importing house, to be ready February 1.

### MISCELLANEOUS NOTES.

#### Harroun Automobile Bumper.

Turner Brass Works, Chicago, Ill., is putting on the market the Harroun automobile bumper, which may be attached to a car of any make and is designed to absorb shocks caused by bumping into other vehicles, garage door jams and walls, thus preventing damage to radiators, lamps, &c. It is a flexible fender projecting across the whole front of the car, made of  $1\frac{1}{4}$ -in. Shelby tubing of heavy gauge, and backed up by spiral springs in such a manner as to absorb collision shocks without damage to itself or the car and equipment. The bumper does not interfere with cranking the motor. It comes brass plated or in plain iron finish, to be painted the same color as the machine. In ordering, the manufacturer's name and model of car should be specified.

#### Charles Ross & Son Company.

In the No. 5 catalogue of Charles Ross & Son Company, 148-156 Classon avenue, Brooklyn, N. Y., recently issued, the following new goods are illustrated and described, in addition to the former line: No. 12 iron frame liquid mill; gang of three No. 9 16 in. water cooled flat stone paint and color mills, with adjustable hinged tops; detachable lead cooling and receiving tables; mammoth change can mixer, with detachable crane for moving can; No. 30 change tank liquid paint thinning, shading and tinting mixer; No. 73 underdriven portable lead and putty chaser; No. 74 portable overdriven chaser or pan mill, and model size kneading and mixing machines.

#### Winchester Self-Loading Rifle Model 1907.

Winchester Repeating Arms Company, New Haven, Conn., New York store, 312 Broadway, has put on the market a high-power self-loading rifle made in .32 and

.35 calibers, shooting a cartridge of .351 caliber, with 180 grain bullet, and having a muzzle velocity of 1861 ft. per second. It will penetrate a steel plate  $\frac{1}{4}$ -in. thick or 26  $\frac{1}{8}$ -in. dry pine boards, when used with metal patched bullets; and 13  $\frac{1}{8}$ -in. dry pine boards, when used with soft point bullets. This cartridge belongs to the high power, smokeless powder type of cartridges and is said to represent the latest development in cartridge manufacture and in powder, the combustion of the powder being complete. Though quite small in size, weighing  $7\frac{1}{4}$  to 8 lb., it is powerful in execution and recommended for use on the largest game. The rifle has the Winchester model 1905 self-loading system, holding 6 shots, 5 of which are loaded into the magazine, which is detachable and can be inserted in the rifle when the bolt is closed, making it quick, safe and handy. It permits carrying extra loaded magazines, by means of which rapid and continuous fire can be maintained, and also makes it unnecessary to work cartridges through the rifle in unloading, the empty shells being ejected from the side. The barrel is stationary, like that of an ordinary rifle, and the sights are attached directly to the barrel to secure accuracy. By giving the take down screw, located at the rear of the receiver, a few turns, the rifle is separated into two parts, the stock and action being in one part and the barrel and receiver in the other. When taken down the exposed working parts are all accessible and can be easily and thoroughly cleaned. In using the rifle, it is absolutely necessary to pull the trigger for each shot, thus placing it under the control of the operator. It is provided with a trigger lock, allowing it to be carried with the hammer at full cock. The standard rifle is equipped with sporting front and rear sights, but a rear peep sight can also be used, if desired. It measures in length over all 38 in. The pistol grip stock is finished with a rubber butt plate, is  $13\frac{1}{8}$  in. long and has a drop of  $1\frac{1}{4}$  in. at the comb and of  $2\frac{1}{4}$  in. at the heel. Only 20-in. round nickel steel barrels can be furnished on the rifles; but fancy stocks, checked or unchecked, or stocks of special dimensions, can be furnished at the same list prices charged for such extras on other models.

#### Union Motor Washing Machine.

Union Motor Company, Pittsburgh, Pa., offers the motor washing machine illustrated herewith. The tub of the machine is made of best quality, thoroughly dried white cedar, bound with electrically welded steel hoops. The maker states that this absolutely prevents expansion or contraction, and that if the tub should stand a year there would be no leak. The castings are of malleable iron, and the whole is said to be of the strongest and most serviceable construction. The motor is made of brass throughout, thus preventing any possibility of rust



Union Motor Washing Machine.

and making it practically indestructible. All the working parts are hand fitted and so adjusted that it is said there is no perceptible wear. Each machine is thoroughly tested in actual operation before leaving the factory. Motors are furnished separately, with feed and exhaust hose and all attachments. They can be attached to any tub having

a rotary dasher. Forty pounds or more pressure is all that is necessary to operate them when connected with a faucet of the city water pipe, speed being regulated by the faucet. There is nothing to be done after the clothing and water have been put into the machine except to turn on the water to start the machine and turn it off when the washing is completed.

#### Automatic Truing and Grinding Machine.

Cleveland Stone Company, Cleveland, Ohio, is manufacturing the grinding machine shown in the accompanying cuts, with automatic truing attachment, which, it is declared, will keep the stone in perfect condition. The

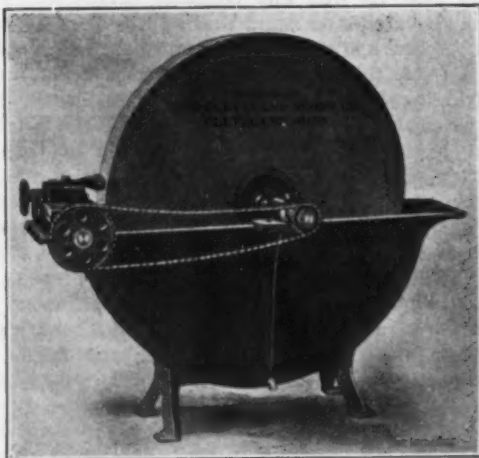


Fig. 1.—Automatic Truing and Grinding Machine.

manufacturer makes the point that the best grindstone will wear unevenly from incompetent or careless use, and the redressing process as commonly performed is so tedious and troublesome that it is often neglected until the stone is in such a condition that it is practically useless for the purpose intended. By the use of the device shown in Fig. 1 the stone can be dressed off in a few minutes, and will, the company states, not only have a uniform, even surface, but will be in just the right condition for good grinding. The truing wheel is made to move back and forth across the surface of the stone by means of the drive chain shown in the cut. Fig. 2 illustrates the device which may be attached to this



Fig. 2.—Automatic Truing and Grinding Machine with Attachment for Grinding Beveled Tools.

machine for grinding beveled edge tools. It is only necessary to remove the arm holding the truing wheel and apply the tool holding device, and almost any beveled tool or knife can be ground quickly, evenly and with the proper bevel. The arm holding the tool can be adjusted to any angle required and the tool will move back and forth across the surface of the stone, so that it is always in contact with a clean, sharp grinding surface.

## Steel Filing Cabinets.

The sectional filing cabinets shown in the accompanying cuts are made by the Metal Sectional Furniture Company, Benton Harbor, Mich. The manufacturer states that the cabinets are built with the idea of turning out the best thing of the kind that can be produced. They are made entirely of steel—frames, backs, tops, side



Fig. 1.—Sectional Steel Filing Cabinet.

panels, drawers and drawer fronts all being of this construction. This affords security for the contents, which is completed by equipping every cabinet with a special lock. Ease of operation is insured, as the drawers run on roller bearings and the form of construction is such that the cabinets are not liable to sag or the drawers to bind. Quick action followers are also provided, which are instantly adjustable at any desired point in the drawers. The finish is olive green enamel, with gold striping and solid brass drawer pulls and label holders

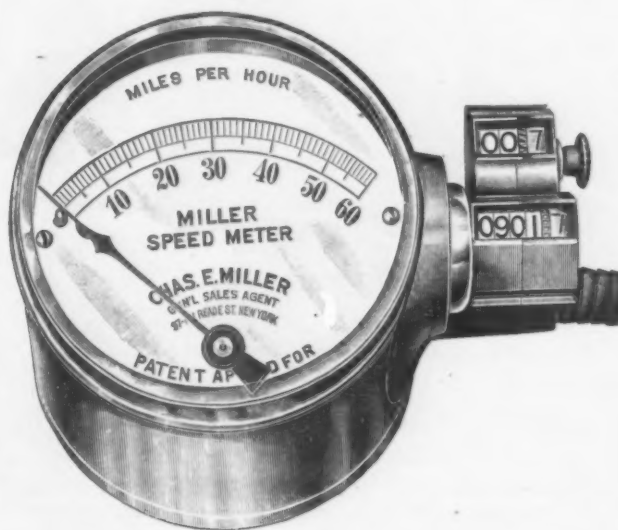


Fig. 2.—Sectional Steel Cabinet with Side Panels Removed.

of generous size. There is no dipped work, but the successive coats of enamel are brushed on, baked at high temperature and rubbed down by hand. Among other advantages it is urged in favor of these cabinets that they will not burn, and the independent steel frames tend to prevent collapse even in a hot fire; they are not affected by changes in temperature or dampness; they afford unusual capacity, although occupying the minimum amount of room, and are absolutely rigid.

## Miller Speed Meter.

Charles E. Miller, 97-101 Reade street, New York, with branches in six large cities, is manufacturing the Miller speed meter, here illustrated. What is claimed for this speed indicator is, that there are comparatively few parts, that it will register down to a rate of 5 miles per hour on a measured course and that it can be readily attached to any automobile regardless of the steering knuckle or axle yoke, thus not requiring any special fittings. It is guaranteed absolutely by the makers for one year if the seal on the instrument is not broken. The meters are regularly made to record a speed up to 60 miles per hour, and can be supplied to order to record up to 100 miles per hour, thus always showing the rate of speed traveled at any given moment; the odometer attached registering both the trip, changeable at will, and a permanent record, unchangeable, to 10,000 miles and repeat. The interior mechanism operates on centrifugal principles. The governor spindle is made of tool steel, hardened and ground to size. The fly ball and links are of brass. The speed meter is made to be attached to the



Miller Automobile Speed Meter.

dash board and is actuated by means of a flexible shaft and crown gear wheels attached to the front wheel of car. The flexible shaft is made from tool steel and each link is oil hardened separately before assembling, the shaft being enclosed in a flexible brass tube. The Miller speed meter is fitted with crown gears, and the large gear to be attached to the hub is made so that it can be fitted to any of the domestic or imported cars without extra attachments or fixtures. The small gear is attached to the end of the flexible shaft and is not attached permanently to steering knuckle, but has a guide attachment which fits loosely to steering knuckle to hold the shaft in proper alignment with the wheel. In adjusting the Miller speed meter to various sizes of wheels, a series of gears are made to correspond to the standard sizes of wheels. As the odometer is mounted on a separate fixture, it can be detached at any time or the speed meter furnished without it if not wanted. The speed meters are supplied regularly in highly polished brass finish but nickel-plated meters can be made on special order.

CHAS. WEILLAND, 147 and 149 Chambers street, New York, is to an increasing extent going into the importation of Cutlery and Tools. He is now carrying large stocks, including Wilson Butcher Knives and Steels, Wade & Butcher Razors and Tools, Side Cutting and Combination Pliers and Nippers, French Cooking Knives, &c. A number of foreign factories are represented, and he also has agents on the other side purchasing goods. At the same time the business will cover all kinds of Mechanics' Tools, Cutlery and Files as heretofore.

**Rochester Auto Square Lamp.**

C. T. Ham Mfg. Company, Rochester, N. Y., for whose line of automobile lamps John H. Graham & Co., 113 Chambers street, New York, are selling agents, has just brought out Ham's patented Rochester auto square lamp, as here illustrated. Square lamps were first used on limousine and landaulet bodies, but they are also being purchased for other styles of automobiles as well. A way has been found for adapting the cold blast principle to a square lamp, whereby a plentiful supply of air is conducted through an invisible tube to the burner, thus delivering an abundance of oxygen to the flame, insuring thorough



*Ham's Rochester Auto Cold Blast Square Lamp.*

combustion and producing a white light of good illuminating power, which, it is said, will neither blow out nor jar out. The metallic portions are brass and the reflector is silver plated. The fount fastens to the body by two levers, one on each side, so that it will not be lost by falling off. The dimensions are, height 14 in., width 6 in., net weight 10½ lb., and there is an oil capacity sufficient to burn 27 hr. The lamps are packed one pair in a case.

**Kinsley Long Distance Wagon Axle.**

Kinsley Iron & Machine Company, Canton, Mass., has commenced the manufacture of the self-oiling axle here shown. This is the first article of the kind the company has ever put on the market, although it has been in the wagon axle business over 50 years. It is declared

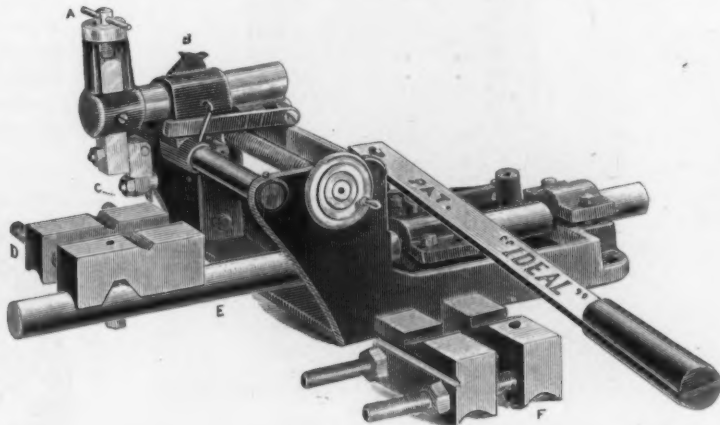


*Kinsley Long Distance Wagon Axle.*

that the axle will run from 600 to 1000 miles without reoiling, thereby saving time, labor and oil. Moreover, it is not necessary to remove the wheel to oil the axle. The oil feed is in the box, not in the spindle, and lubricates the whole length of the spindle from collar to nut. At the same time the spindle is always kept clean by the revolution of the lubricating felt. The sizes made range from 1¼ to 3¼ in., and the lines listed include loose collar Concord, solid collar express and boxes without axles. Square beds, coach beds and crank beds are extra.

**Ideal Hand Planer.**

The accompanying illustration shows a hand planer made by Ideal Machine Works, 255-257 Thirty-ninth street, Brooklyn, N. Y. It is designed to do the work of die makers, engravers and other metal workers, which usually is laboriously done with a file, with the added advantage that the work will be flat and true to any angle. It will plane 4 x 5 in., but occupies only about 1 sq. ft. on the bench. The manufacturer states that it will take the place of the ordinary bench vise for a great number of jobs. The machine is furnished with a self-hardening high speed tool, double pointed, which feeds down 1½ in., and can be set at any angle. The feed is automatic and can be set to score lines or plane grooves to any desired fraction of an inch apart. Referring to the cut, A is the screw for moving the tool down, B is



*Ideal Hand Planer.*

the automatic feed ratchet, C the tool, D the vise clamp for holding the work, and E the sliding bar carrying the vise. F is the vise lying separate, which can be set parallel or at right angles with the sliding bar, to which it is attached. It can also be removed in a moment and used as a clamp on a drill press, or on the bench, or it can be used as parallels or V-blocks. All parts liable to wear are made adjustable. The machine weighs 40 lb.

**White's Bonanza Furnace No. 34.**

Turner Brass Works, Chicago, is manufacturing the No. 34 White's Bonanza furnace, here shown. It burns gasoline and has a tank made of heavy galvanized iron. The maker recommends it for plumbers, tanners, roofers and all other metal workers. The furnace has a special



*No. 34 White's Bonanza Furnace.*

bronze burner, and is equipped with an automatic brass pump set inside the tank. Its operation is not interfered with by wind or weather. Dimensions are: Height over all, 12 in.; diameter, 9¼ in.; net weight, 9½ lb.; shipping weight, 15 lb. Its capacity is 1 gal., and its consumption is ¼ pint per hour.

## The Grimm Sap Spout No. 5.

G. H. Grimm, Rutland, Vt., has put on the market the No. 5 sap spout shown herewith, which differs in particulars from his No. 4, which was intended to be used in a



The Grimm Sap Spout No. 5.

bore made with a 7-16 in. bit. In many sections where maple sugar is made there was a demand for a spout suitable for a bore made with a 3/8-in. bit, and for this purpose the new spout was made. Many of the buckets that sugar makers have in use were punched for a spout

less in diameter than the No. 4, and to overcome this difficulty the No. 5 spout is made smaller so that the hole referred to is of sufficient capacity to slip over it. The spout is made of tempered steel and is coated with a metal that is designed not to rust, not to poison the wound in the tree, and has no spurs, anchors or shoulders, which might crush the bark. It also prevents decay of the bark surrounding the bore. It can be driven with an ordinary hammer, cannot overlap, is easily kept clean and is said to last a life time, with ordinary care. The spout permits reaming as it will fit any size bore from 3/8 to 1/2 in., and permits the use of a satisfactory cover on the buckets.

UNTIL further notice the Horton Mfg. Company, Bristol, Conn., has decided to guarantee its Bristol Steel Fishing Rods for three years instead of one year as heretofore. The three-year guarantee will apply to all Bristol Rods sold since October 1, that is, Rods shipped from the company's factory since that date. This action will be regarded as a pretty good proof of the company's faith in its product, and should make a good selling argument for retail merchants.

## PAINTS, OILS AND COLORS

## Animal, Fish and Vegetable Oils—

Linseed, City, raw.....	42	@43
City, Boiled.....	43	@44
State and Western, raw.....	41	@42
Raw Calcutta, in bbls.....	70	@
Lard, Extra Prime, Winter.....	77	@78
Extra No. 1.....	50	@51
No. 1.....	44	@45
Cotton-seed, Crude, f.o.b. mills.....	@	
Summer Yellow, Prime.....	42 1/2	@43 1/2
Summer White.....	50	@50
Sperm, Crude.....	62	@63
Natural Winter.....	65	@66
Bleached Winter.....	68	@69
Bleached Winter, Extra.....	70	@72
Tallow, Prime.....	55	@56
Whale, Crude.....	35	@36
Natural Winter.....	45	@46
Bleached Winter.....	47	@48
Extra Bleached Winter.....	49	@50
Menhaden, Brown, Strained.....	29	@32
Light, Strained.....	29	@32
Northern.....	28	@
Southern.....	27	@
Cocoonut, Ceylon.....	30	@35
Cochin.....	30	@35
Cod, Domestic, Prime.....	30	@35
Newfoundland.....	34 1/2	@42
Red, Elaine.....	45	@46
Saponified.....	45	@46
Olive, Italian, bbls.....	65	@66
Neatsfoot, Prime.....	49	@50
Palm, Logos.....	7	@7 1/2

## Mineral Oils—

Black, 29 gravity, 25@30 cold test.....	10 1/2	@11 1/2
29 gravity, 15 cold test.....	11 1/2	@12 1/2
Summer.....	10 1/2	@11 1/2
Cylinder, light filtered.....	18	@19
Dark, filtered.....	16	@17
Paraffine, 903-907 gravity.....	13 1/2	@14
903 gravity.....	12 1/2	@13
883 gravity.....	10 1/2	@10 3/4
Red.....	12 1/2	@14

## Miscellaneous—

Barytes:		
White, Foreign.....	18.50	@20.00
Amer. floated.....	19.00	@
Off color.....	11.50	@15.50
Chalk, in bulk.....	3.00	@3.25
In bbls.....	100 lb	@ .35
China Clay, English.....	11.00	@17.00
Cobalt, Oxide.....	100 lb	2.50 @ 2.60
Whiting, Commercial.....	100 lb	.43 @ .52
Gilders.....	100 lb	.50 @ .55
Ex. Gilders.....	100 lb	.55 @ .60

## Putty, Commercial—

In bladders.....	1.70	@1.85
In bbls. or tubs.....	1.20	@1.40
In 1 lb to 5 lb cans.....	2.65	@2.95
In 12 1/2 to 50 lb cans.....	1.50	@1.90

## Spirits Turpentine—

In gal.....	69 1/2	@70
In machine bbls.....	70	@70 1/2

## Glue—

Cabinet.....	.11	@15
Common Bone.....	.7	@9
Extra White.....	.18	@24
Foot Stock, White.....	.11	@14
Foot Stock, Brown.....	.5	@11
German Hide.....	.12	@18
French.....	.10	@40
Irish.....	.13	@16
Low Grade.....	.9	@12
Medium White.....	.14	@17

## Gum Shellac—

Bleached Commercial.....	.47	@48
Bones, Dried.....	.40	@50
Button.....	.10	@10
Diamond.....	.52	@55
Fine Orange.....	.47	@49
A. C. Garnet.....	.37	@38
Kala Button.....	.37	@38
G. A. L. Garnet.....	.45	@45 1/2
D. C.....	.59	@59
Octagon B.....	.45	@45 1/2
T. N.....	.45	@45 1/2
V. S. O.....	.45	@45 1/2

## Colors in Oil—

Black, Lampblack.....	.12	@14
Blue, Chinese.....	.34	@46
Blue, Prussian.....	.32	@36

Blue, Ultramarine.....	.12	@16
Brown, Vandyke.....	.11	@14
Green, Chrome.....	.12	@16
Green, Paris.....	.12	@24
Sienna, Raw.....	.12	@15
Sienna, Burnt.....	.12	@15
Umber, Raw.....	.11	@14
Umber, Burnt.....	.11	@14

## White Lead, Zinc, &amp;c.—

Lead, American White:		
Lots of 500 lb or over, in Oil ..	@ 7	
Lots less than 500 lb, in Oil ..	@ 7 1/2	
Dry in Barrels.....	@ 6 1/2	
Lead, English white, in Oil.....	9 1/2 @ 10	
Lead, White, in oil, 25 lb tin		
pails, add to keg price.....	@ 1/2	
Lead, White, in oil, 12 1/2 lb tin		
pails, add to keg price.....	@ 1	
Lead, White, in oil, 1 to 5 lb		
assorted tins, add to keg price ..	@ 1 1/4	
Lead, American, Term: For lots 12		
tons and over 1/4¢ rebate; and 2% for		
cash if paid in 15 days from date of		
invoice; for lots of 500 lbs. and over		
2% for cash if paid in 15 days from		
date of invoice, for lots of less than		
500 lbs. net.....	9 1/2 @	
Zinc, American, dry.....	5 1/2 @ 5 1/4	
Zinc, French:		
Antwerp, Red Seal, dry.....	8 1/2	
Antwerp, Green Seal, dry.....	10 1/2	
Paris, Red Seal, dry.....	9 1/2	
Paris, Green Seal, dry.....	11	
Zinc, V. M. French, in Poppy Oil:		
Green Seal:		
Lots of 1 ton and over.....	13 1/2 @ 13 1/4	
Lots of less than 1 ton.....	13 1/4 @ 13 1/2	
Zinc, V. M. French, in Poppy Oil:		
Red Seal:		
Lots of 1 ton and over.....	11 1/2 @ 12 1/2	
Lots of less than 1 ton.....	12 1/2 @ 13 1/2	
Discounts—French Zinc—Discounts		
to buyers of 10 bbl. lots of one or mixed		
grades, 1% 25 bbls., 2% 50 bbls., 4%.		

## Dry Colors—

Black, Carbon.....	6 1/2 @ 11	
Black, Drop, American.....	4 @ 6	
Black, Drop, English.....	5 @ 15	

Black, Ivory.....	16	@20
Lamp, Com.....	4	@6
Blue, Celestial.....	4	@6
Blue, Chinese.....	2	@32
Blue, Prussian.....	27	@30
Blue, Ultramarine.....	1 1/2	@15
Brown, Spanish.....	1/4	@1
Carmine, No. 40.....	3.00	@3.25
Green, Chrome, ordinary.....	3 1/2	@6
Green, Chrome, pure.....	17	@25
Lead, Red, bbls., 1/2 bbls. and kegs:		
Lots 500 lb or over.....	@ 7 1/4	
Lots less than 500 lb.....	@ 7 1/2	
Litharge, American, bbls.....	7 1/2	@7 1/4
Other, American.....	7 1/2	@7 1/4
American Golden.....	2 1/2	@3 1/2
French.....	1 1/2	@2
Foreign Golden.....	3	@4
Orange Mineral, English.....	10	@12
French.....	10 1/2	@12
German.....	8 1/2	@10
American.....	8 1/2	@10
Red, Indian, English.....	1 1/2	@1 1/2
American.....	3	@3 1/2
Red, Turkey, English.....	4	@10
Red, Tuscan, English.....	7	@10
Red, Venetian, Amer.....	100 lb	\$0.50 @ 1.25
English.....	100 lb	\$1.15 @ 1.75
Sienna, Italian, Burnt and		
Powdered.....	3	@9 1/2
Italian, Raw, Powdered.....	3	@9 1/2
American, Raw, Powdered.....	1 1/2	@2
American Burnt and Powdered.....	1 1/2	@2
Talc, French.....	2 ton	\$17.00 @ 25.00
American.....	2 ton	17.00 @ 25.00
Terra Alba, French.....	100 lb	.90 @ 1.00
English.....	100 lb	.90 @ 1.00
American.....	100 lb	.75 @ .90
American.....	100 lb	.60 @ .65
Umber, Turkey, Bnt. & Pow.....	2 1/2	@3 1/2
Turkey, Raw and Powdered.....	2 1/2	@3 1/2
Burnt, American.....	1 1/2	@2
Raw, American.....	1 1/2	@2
Yellow Chrome.....	12	@14
Vermilion, American Lead.....	10	@25
Quicksilver, bulk.....	65	@
Quicksilver, bags.....	66	@
English, Imported.....	65	@70
Chinese.....	30.90	@1.00

## THE IRON AGE

The oldest paper in the world devoted to the interests of the Hardware, Iron, Machinery and Metal Trades, and a standard authority on all matters relating to those branches of industry.

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ENTERED AT THE POST OFFICE, NEW YORK, AS SECOND-CLASS MATTER.

# Current Hardware Prices.

**General Goods.**—In the following quotations General Goods—that is, those which are made by more than one manufacturer—are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

**Special Goods.**—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

**Range of Prices.**—A range of prices is indicated by means of the symbol @. Thus 33% @ 33% & 10% signifies

that the price of the goods in question ranges from 33% per cent. discount to 33% and 10 per cent. discount.

**Names of Manufacturers.**—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued May, 1906, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

**Standard Lists.**—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

**Additions and Corrections.**—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

## Adjusters, Blind—

Domestic,  $\frac{1}{2}$  doz. \$3.00.....33%  
North's.....30%  
Zimmerman's—See Fasteners, Blind.  
**Window Stop—**  
Ives' Patent.....35%  
Taplin's Perfection.....35%

## Ammunition—See Caps, Cartridges, Shells, &c.

**Anti-Rattlers—**  
Fernald Mfg. Co. Burton Anti-Rattlers,  $\frac{1}{2}$  doz. pairs, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 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of 10% is given.

**Extractors, Lemon Juice****Fasteners, Blind—**

—See Squeezers, Lemon.  
Zimmerman's ..... 50¢10¢  
Walling's ..... 40¢10¢

**Cord and Weight—**

Ives ..... 33½%

**Faucets—**

Cork Lined ..... 50¢10¢10¢  
Metallic Key, Leather Lined ..... 60¢10¢70¢

Red Cedar ..... 40¢10¢50¢  
Petroleum ..... 70¢10¢75¢

B. & L. B. Co.:  
Metal Key ..... 50¢10¢  
Star ..... 60¢

West Lock ..... 50¢10¢  
John Sommer's Peerless Tin Key ..... 50¢

John Sommer's Boss Tin Key ..... 50¢  
John Sommer's Victor Mtl. Key ..... 50¢10¢

John Sommer's Duplex Metal Key ..... 60¢  
John Sommer's Diamond Lock ..... 40¢

John Sommer's I. X. L. Cork Lined ..... 50¢  
John Sommer's Reliable Cork Lined ..... 50¢10¢

John Sommer's Chicago Cork Lined ..... 60¢  
John Sommer's O. K. Cork Lined ..... 50¢

John Sommer's No Brand, Cedar ..... 50¢  
John Sommer's Perfection, Cedar ..... 50¢

McKenna, Brass:  
Burglar Proof, N. F. ..... 25¢

Improved, ½ and ¾ inch ..... 25¢  
Self Measuring:  
Enterprise, ½ doz. \$36.00 ..... 40¢10¢

Lane's, ½ doz. \$36.00 ..... 40¢10¢  
National Measuring, ½ doz. \$36.00 ..... 40¢10¢

**Felloe Plates—**

—See Plates, Felloe.

**Files— Domestic—**

List Nov. 1, 1899.

Best Brands ..... 70¢10¢75¢10¢  
Standard Brands ..... 75¢10¢75¢10¢10¢

Lower Grade ..... 75¢10¢10¢80¢10¢

**Imported—**

Stude's Tapers, Stude's list, July 24, '97 ..... 33 1-3 to 40%

**Fixtures, Fire Door—**

Richards Mfg. Co.:  
Universal, No. 103; Special, No. 104 ..... \$3.75

Fusible Links, No. 00 ..... 80¢  
Expansion Bolts, No. 107 ..... 60¢10¢

**Grindstone—**

Net Prices:  
Inch ..... 15 17 19 21

Per doz. ..... \$3.85 3.75 4.25 4.75  
P. B. & W. Co. .... 30¢10¢

Reed Hardware Co. .... 60¢  
Stowell's Giant Grindstone Hanger ..... 50¢

Stowell's Grindstone Fixture, Extra Heavy, 40¢10¢; Light ..... 50¢

**Feeder Squeezers—**

See Compressors.

**Forks—**

NOTE.—Manufacturers are selling from the list of September 1, 1904, but many jobbers are still using list of August 1, 1899, or selling at net prices.

Iowa Dig-Easy Potato ..... 50¢10¢

Victor, Hay ..... 60¢15¢2½¢

Victor, Manure ..... 60¢

Victor, Header ..... 60¢

Champion, Hay ..... 60¢

Champion, Header ..... 60¢

Champion, Manure ..... 60¢15¢2½¢

Columbia, Hay ..... 60¢20¢

Columbia, Manure ..... 60¢10¢5¢

Columbia, Spading ..... 70¢12½¢

Hawkeye Wood Barley ..... 40¢

W. & C. Potato Digger ..... 60¢10¢

Acme Hay ..... 60¢20¢

Acme, Manure, 4 tine ..... 60¢10¢5¢

Dakota Header ..... 60¢20¢

Jackson Steel Barley ..... 60¢

Kansas Header ..... 60¢

W. & C. Favorite Wood Barley ..... 40¢

Plated.—See Spoons.

**Frames— Saw—**

White, 8" x 4" Bar, per doz. 75¢80¢

Red, 8" x 4" Bar, per doz. \$1.00\$1.25

Red, Dbl. Brace, per doz. \$1.40\$1.50

**Freezers, Ice Cream—**

Qt. .... 1 2 3 4 6

Each ..... \$1.30 \$1.60 \$1.90 \$2.20 \$2.50

**Fruit and Jelly Presses—**

See Presses, Fruit and Jelly.

**Fry Pans—See Pans, Fry.****Fuse—**

Per 1000 Feet.

Hemp ..... \$2.75

Cotton ..... 3.20

Waterproof Sgl. Taped. 3.65

Waterproof Dbl. Taped. 4.40

Waterproof Tpl. Taped. 5.15

**Gates, Molasses and Oil—**

Stebbins' Pattern ..... 80¢10¢

**Gauges—**

Marking, Mortise, etc. 50¢50¢10¢

Chapin-Stephens Co.:  
Marking, Mortise, etc. 50¢50¢10¢

Diston's Marking, Mortise, etc. 67½¢

Stanley R. & L. Co.'s Butt and Rabbit Gauge ..... 25¢

Marking and Mortise ..... 25¢

Wire, Brown & Sharpe's ..... 33½¢

Wire, Morse's ..... 25¢

Wire, P. S. & W. Co. .... 30¢

**Gimlets— Single Cut—**

Numbered assortments, per gro.

Nail, Metal, No. 1, \$2.00; 2, \$2.50

Spike, Metal, No. 1, \$4.00; 2, \$4.50

Nail, Wood Handled, No. 1, \$2.50; 2, \$2.60

Spike, Wood Handled, No. 1, \$4.50; 2, \$4.60

**Glass, American Window**

See Trade Report.

**Glasses, Level—**

Chapin-Stephens Co. .... 60¢60¢10¢

**Glue, Liquid Fish—**

Bottles or Cans, with Brush ..... 25¢10¢50¢

International Glue Co. (Martin's) ..... 40¢

**Grease, Axle—**

Common Grade ..... gro. \$4.50¢6.00

Dixon's Everlasting, 10-lb pails, ea. 85¢; in boxes, ½ doz., 1 lb, \$1.20;

2 lb ..... \$2.00  
Helmet Hard Oil ..... 25¢

**Griddles, Soapstone—**

Pike Mfg. Co. .... 33½¢33½¢10¢

**Grindstones—**

Pike Mfg. Co.:  
Improved Family Grindstones, ½ inch, ½ doz., \$2.00 ..... 33½%

Royal Mfg. Co.:  
Aluminum Grinding Machines, each, Nos. 01, \$1.75; 1A, \$2.50; 1B, \$3.00 ..... 30%

Aluminum Sickle Grinders, each, Nos. 20A, \$6.00; 20A Combined, \$6.50 ..... 30%

Aluminum Disc Grinders, each, \$2.50 ..... 30%

**Grips, Nipple—**

Perfect Nipple Grips ..... 40¢10¢2%

**Halters and Ties—**

Cop Ties ..... 60¢5¢60¢10¢

Covert Mfg. Co.:  
Web ..... 30¢2%

Jute Rope ..... 35¢

Sisal Rope ..... 30¢

Cotton Rope ..... 45¢

Hemp Rope ..... 45¢

Oneida Community:  
Am. Coil and Halters ..... 40¢40¢5%

Am. Cow Ties ..... 45¢60¢

Niagara Coil and Halters ..... 45¢50¢5%

Niagara Cow Ties ..... 45¢50¢50¢10¢5%

**Hammers—****Handled Hammers—**

Heller's Machinists' ..... 55¢10¢55¢10¢5%

Heller's Farmers' ..... 40¢50¢10¢45¢

Magnetic Tack, Nos. 1, 2, 3, \$1.25; \$1.50, \$1.75 ..... 50%

Peck, Stow & Wilcox, Steel ..... 50%

Fayette R. Plumb:  
Plumb, A. E. Nail ..... 40¢2½¢40¢12½%

Engineers' and B. S. Hand ..... 50¢12½¢60%

Machinists' Hammers ..... 50¢15¢60¢5%

Riveting and Timers ..... 40¢2½¢40¢12½%

**Heavy Hammers and Sledges—**

Under 3 lb., per lb., 50¢80¢5¢ ..... %

3 to 5 lb., per lb., 40¢80¢5¢ ..... %

Over 5 lb., per lb., 30¢ ..... %

Wilkinson's Smiths' ..... lb. 9½¢10½¢

**Handles—**

Agricultural Tool Handles

Aze. Pick, etc. .... 60¢10¢60¢10¢5%

Hoe, Rake, etc. .... 40¢15¢5%

Fork, Shovel, Spade, etc. .... 40¢15¢5%

Long Handles ..... 40¢15¢5%

D Handles ..... 40%

**Cross-Cut Saw Handles—**

Atkins' ..... 40%

Champion ..... 50%

Diston's ..... 50%

**Mechanics' Tool Handles—**

Auger, assorted ..... gro. \$2.50\$3.00

Brad Axl. .... gro. \$1.68\$1.75

Chisel Handles, Ass'd, per gro.:  
Tanged Farmer, Apple, \$2.40\$2.65; Hickory, \$2.15\$2.40

Socket Firming, Apple, \$1.75\$1.95; Hickory, \$1.45\$1.60

Socket Framing, Hickory, \$1.60\$1.75

File, assorted ..... gro. \$1.30\$1.40

Hammer, Hatchet, etc. .... 60¢10¢60¢10¢5%

Hand Saw, Varnished, doz. 80¢85¢; Not Varnished, doz. 65¢75¢

Plane Handles:  
Jack, doz. 30¢; Jack, Bolted, 75¢

Fore, doz. 45¢; Fore, Bolted, 90¢

Chapin-Stephens Co.:  
Chisel ..... 60¢65¢10¢

File and Awl ..... 60¢65¢10¢

Saw and Plane ..... 60¢65¢10¢

Screw Driver ..... 40¢40¢10¢

Miller Falls Adl. and Hatchet Auger Handles ..... 20¢10%

Nicholson Simplicity File Handle ..... 30¢

**Hangers—**

NOTE.—Barn Door Hangers are generally quoted per pair, without track, and Parlor Door Hangers per double set with track, etc.

**Allth Mfg. Co.:  
Reliable, No. 1; Allth, No. 3; Al-**

lith Adjustable, No. 6; Reliable Parlor Door ..... 50%

Chicago Spring Butt Co.:  
Friction ..... 75%

Oscillating ..... 25%

Big Twin ..... 25%

Chas. H. & Moore Mfg. Co.:  
Baggage Car Door ..... 50%

Elevator ..... 30%

Railroad ..... 50%

Cronk & Carrier Mfg. Co.:  
Loose Axle, No. 10 ..... 60¢10%

Roller Bearing ..... 70%

Griffin Mfg. Co.:  
Solid Axle, No. 10, \$12.00 ..... 70%

Roller Bearing, No. 11, \$15.00 ..... 70%

Roller Bearing, Ex. Hy., No. 22, \$18.00 ..... 70%

Hinged Hangers, \$16.00 ..... 60¢10%

Lane Bros. Co.:  
Standard, \$3.15; No. 105, \$2.85; New Model, \$2.80; New Cham-

pion, \$2.25

Barn Door, Standard, \$6.05

Hinged ..... net \$6.08

Covered ..... 60¢12%

Crown ..... 70¢5%

Cyclone Tandem ..... net \$7.50

Easy Parlor Door, Dbl. Sets, \$2.50; Single Sets, \$1.25

Giant ..... 60%

Hummer ..... 70¢12%

New Cyclone, Flexible, \$15.00; New York ..... 60¢2½%

McKinney Mfg. Co.:  
No. 1, Special, \$15 ..... 60¢10%

No. 2, Standard, \$18 ..... 60¢10%

Hinged Hangers, \$16 ..... 50%

McGowan Hangers ..... 60¢5%

Richards Mfg. Co.:  
Hangers, Nos. 47, 48, 147, 247, \$10.00; No. 130, \$12.00 ..... 70¢7½%

Pioneer Wood Track, No. 3, \$2.25

Roller B'r's St'l Track No. 12, \$2.20

Roller B'r's St'l Track No. 13, \$2.50

Roller B'r's, No. 30, 41, 70, 7½¢

Hero, Adj. Track No. 19, 50¢10%

Adjustable Track Tandem Trolley Track No. 16, 50¢10%

Seal, Steel Track No. 8, \$2.25

Auto Adj. Track No. 22, 60¢5%

Trolley H. D. No. 17, \$1.25; F. D. No. 18, \$1.25; No. 19, \$1.25; No. 150, \$2.50

Safety Underwriters F. D. No. 101 ..... 50%

Tandem No. 41, 2½ and 3 60¢10%

Palace, Adjustable Track No. 132 ..... 50¢5%

Royal, Adjustable Track No. 122 ..... 50¢10%

Apex Wood Track No. 1, \$2.25

Trolley H. D. No. 20, 50¢10%

Trolley B. D. No. 24, \$1.30; No. 27, \$1.40; No. 28, \$1.60

Roller Bearings, Nos. 37, 38, 39, 41, 43, 44, Sizes 1 and 2, 70¢7½%

Anti-friction, No. 42; No. 44, 70¢7½%

Hinged Tandem, No. 48, 60¢5%

Folding Door B. B. Swivel No. 135 ..... 40%

Stowell Mfg. & Foundry Co.:  
Acme Parlor Ball Bearing ..... 30%

Ajax Hinge Door ..... 60%

Atlas Parlor Door ..... 50¢10¢5%

Atlas ..... 60%

Baggage Car Door ..... 50%

Climax Anti-Friction ..... 50%

Elevator ..... 40%

Express ..... 50%

Parlor Door ..... 50%

Matchless ..... 60%

Nansen ..... 70%

Parlor Door, 50¢10%; Railroad, 50¢10%

Steel, Nos. 300, 404, 500 ..... 50%

Underwriters' Fire Door ..... 40%

Wild West Warehouse Door, 43 Wilburn, No. 0, net, ½ doz., \$9.00

**Screw Hook and Eye:**

1/4 to 1 inch.....	lb. 6 1/2
1/2 inch.....	lb. 7 1/2
3/4 inch.....	lb. 8 1/2

**Hitchers, Stall—**

Covert Mfg. Co., Stall Hitchers.....30&amp;2%

**Hods—Coal—**

M'f'r's list, price per gross.

Inch.....	15	16	17	18
Galv. Open.....	\$35	\$39	\$42	\$46
Jap. Open.....	36	38	37	35
Galv. Funnels.....	43	48	53	56
Jap. Funnels.....	33	36	39	43

**Masons' Etc.—**Cleveland Wire Spring Co.  
Steel Brick, No. 162.....each \$1.05  
Steel Mortar, No. 158.....each \$1.35**Hoes—Eye—**

Scovill and Oral Pattern.....

Grub, list Feb. 23, 1899.....

D. &amp; H. Scovill.....

**Handled—**

NOTE.—Manufacturers are selling from the list of September 1, 1904, but many jobbers are still using list of August 1, 1899, or selling at net prices.

Cronk's Weeding, No. 1, \$2.75; No. 2, \$2.50

Star Double Bit.....\$3.20

Ft. Madison Cotton Hoe.....\$3.20

Ft. Madison Crescent Cultivator Hoe.....\$3.20

Ft. Madison Mattock Hoe.....\$3.20

Regular Weight.....\$3.20

Junior Size.....\$3.20

Ft. Madison Sprouting Hoe.....\$3.20

Ft. Madison Dixie Tobacco Hoe.....\$3.20

Kretzinger's Cut Easy.....\$3.20

Warren Hoe.....\$3.20

W. &amp; C. Ivanhoe.....\$3.20

B. B. 6 in. Cultivator Hoe.....\$3.20

Acme Weeding.....\$3.20

W. &amp; C. L'ning Shuffie Hoe.....\$3.20

**Hoisting Apparatus—**

See Machines, Hoisting.

**Holders—Bit—**

Angular, \$3 doz. \$24.00.....45&amp;10%

**Door—**

Bardley's, Iron, 40%; Brass and

Bronze.....35&amp;10%

Empire.....35&amp;10%

Pullman.....35&amp;10%

Superior.....35&amp;10%

**File and Tool—**

Nicholson File Holders and File

Handles.....35&amp;10%

**Fruit Jar—**

Triumph Fruit Jar Holder, \$3 gross,

\$10.80; \$3 doz. \$1.25

**Trace and Rein—**

Fernald Double Trace Holder, \$3 doz,

pairs.....\$1.25

Dash Rein Holder, \$3 doz. pairs.....\$1.25

**Hones—Razor—**

Pike Mfg. Co., Belgian, German and

Swat.....50%

**Hooks—Cast Iron—**

Bird Cage, Reading.....40%

Clothes Line, Reading List.....40%

Clothes Line, Stowell.....40%

Coat and Hat, Reading.....40%

Coat and Hat, Stowell.....40%

Coat and Hat, Wrightville.....40%

Harness, Reading List.....40%

Harness, Stowell.....40%

School House, Stowell.....40%

**Wire—**

Belt.....60&amp;10%

Wire C. &amp; H. Hooks.....75&amp;10%

Columbian Hdw Co., Gen.....70&amp;10%

Parker Wire Goods Co., King.....70&amp;10%

Western W. G. Co., Molding.....75%

Wire Goods Co.  
Acme, 60&10%; Chief, 70%; Crown,

75%; Crow, 65%; V. Brace, 75%;

Czar Harness, 50&amp;10%.

**Wrought Iron—**

Box, 6 in., per doz., \$1.00; 8 in.,

\$1.25; 10 in., \$2.50.

Cotton.....\$1.05&amp;\$1.25

Wrought Staples, Hooks, &amp;c.—

See Wrought Goods

**Miscellaneous—**

Hooks, Bench, see Stops, Bench.

Bush, Light, doz. \$1.75; Medium,

\$3.35; Heavy, \$5.25

Grass, best, all sizes, per doz. \$1.40

Grass, common grades, all sizes,

per doz.....\$1.30

Whiffletree.....lb. 5 1/2&amp;6 1/4

**Hooks and Eyes:**

Brass.....60&amp;5@60&amp;10&amp;65%

Malleable Iron.....70&amp;10&amp;10%

Covert Mfg. Co. Gate and Scuttle

Hooks.....40%

Bench Hooks—See Bench Stops.

Corn Hooks—See Knives, Corn.

**Horse Nails—**

See Nails, Horse.

**Horse Shoes—**

See Shoes, Horse.

**Hose, Rubber—**

Garden Hose, 1/2-inch:

Competition.....ft. 8 @ 6 1/2

3-ply Guaranteed.....ft. 8 @ 9 1/2

4-ply Guaranteed.....ft. 10 @ 11 1/2

Cotton Garden, 1/2-in., coupled:

Low Grade.....ft. 8 @ 9 1/2

Fair Quality.....ft. 10 @ 11 1/2

**Irons—Sad—**

From 1 to 10.....lb. 3 @ 3 1/4

R. B. Sad Irons.....lb. 3 @ 3 1/4

Mrs. Potts, cents per set:

Nos. 25 33 40 65

Jap'd Tops.....65 62 75 75

Tin'd Tops.....70 67 80 77

New England Pressing, lb. 3 @ 1 1/4

**Pinking—**

Pinking Irons.....doz. 60¢

**Irons, Soldering**

See Copiers.

**Jacks, Wagon—**Covert Mfg. Co.:  
Auto Screw.....30&2%; Steel, 45%

Lockport.....50%

Lane's Steel.....30&amp;10&amp;2%

Richards' Tiger Steel, No. 130.....50&amp;10%

Smith &amp; Hemenway Co.'s.....25%

**Kettles—**

Brass, Spun, Plain.....20&amp;25%

Enameled and Cast Iron—See Ware,

Hollow.

**Knives—**

Butcher, Kitchen, &amp;c.—

Foster Bros. Butcher, &amp;c.....30%

Wilkinson Shear &amp; Cutlery Co.....60%

**Corn—**

Wilkinson Shear &amp; Cutlery Co.

Wileut Brand Knives and Hooks.....60%

Withington Acme, \$3 doz. \$2.65;

Dent, \$2.75; Adj. Serrated, \$2.20;

Serrated, \$2.10; Yankee No. 1, \$1.50;

Yankee No. 2, \$1.15.

**Drawing—**

Standard List.....75&amp;5@75&amp;10%

C. E. Jennings &amp; Co., Nos. 49, 46, 67,

Jennings &amp; Griffin, Nos. 41, 42.....75%

Swan's.....70%

Watrous.....16%

L. &amp; I. J. White.....20&amp;5&amp;25%

**Hay and Straw—**

Serrated Edge, per doz. \$5.75 to \$6.00

Ivan's Sickle Edge.....\$3 doz. \$9.50

Ivan's Serrated.....\$3 doz. \$10.00

**Mincing—**

Buffalo.....\$3 doz. \$13.00

**Miscellaneous—**

Farriers'.....\$3 doz. \$3.00 to \$3.25

Westenholm's.....\$3 doz. \$3.00 to \$3.25

**Knobs—**

Base, 2 1/2-inch, Birch, or Maple,

Rubber Tip.....\$1.25 to \$1.40

Carriage, Jap., all sizes.....

gro. 10 @ 15¢

Door, Mineral.....\$3 doz. \$5.75 to \$6.00

Door, Por. Jap'd.....\$3 doz. \$7.75 to \$8.00

Door, Por. Nickel.....\$3 doz. \$8.00 to \$8.25

Bardley's Wood Door, Shutters, &amp;c. 15%

**Lacing, Leather—**

See Belting, Leather—

**Ladders, Store, &c.—**

Allith Mfg. Co., Reliable.....50%

Lane's Store.....25%

Myers' Noiseless Store Ladders.....50%

Richards' Mfg. Co.:  
Improved Noiseless, No. 112.....50%

Climax Shelf, No. 113.....50%

Trolley, No. 109.....50%

**Ladies, Melting—**

L. &amp; G. Mfg. Co. (low list).....25%

P. S. &amp; W.....40&amp;10%

Reading.....60%

**Lanterns—Tubular—**

Regular Tubular, No. 0.....

doz. \$1.25 to \$1.50

Lift Tubular, No. 0.....

doz. \$1.75 to \$2.00

Hinge Tubular, No. 0.....

doz. \$1.75 to \$2.00

Other Styles.....\$1.00 to \$1.50

**Bull's Eye Police—**

No. 1, 2 1/2-inch.....\$2.75 to \$3.00

No. 2, 3-inch.....\$3.00 to \$3.25

**Lasts and Stands, Shoe—**

Stowell's Atlas, Malleable Iron.....50%

Stowell's Badger, Cast Iron.....50%

**Latches—Thumb—**

Roggin's Latches, with screw.....

doz. 35¢ to 40¢

**Door—**

Allith Mfg. Co., Automatic, No.

400 \$3 doz. \$4.00

Crouk &amp; Carrier Mfg. Co., No. 101,

\$3 doz. \$2.30

Crouk &amp; Carrier Mfg. Co., Late,

Hasp and Staples.....50%

Richards' Bull Dog, Heavy, No.

125.....50&amp;5%

Richards' Trump, No. 127.....\$1.50

Stowell's Steel.....50%

**Leaders, Cattle—**

Small.....\$3 doz. 50¢; large, 60¢

Covert Mfg. Co.:  
Cotton, 45%; Hemp, 45%; Jute, 35%;

Sisal, 20%.

**Lifters, Transom—**

R. &amp; E.....10%

**Lines—**

Wire Clothes, Nos. 18 19 20

100 feet.....\$2.25 2.00 1.75

75 feet.....\$1.75 1.55 1.10

Anniston Waterproof Clothing, 50 ft.,

\$9 gro. \$25.00; Gilt Edge, \$23.00; Air

Line, \$23.00; Acme, \$19.00; Alabama,

\$17.00; Empire, \$16.00; Advance,

\$14.00; Eclipse, \$13.50; Chicago,

\$11.50; Standard, \$10.50; Columbia,

\$9.50; Allston, \$13.50; Calhoun, \$12.00.

Samson Cordage Works:  
Solid Braided Chalk, Nos. 0 to 3, 40%

Silver Lake Braided Chalk, No. 0,

\$6.00; No. 1, \$6.50; No. 2, \$7.00; No.

3, \$7.50.....\$6.00 to \$7.50

Manass' Lines, Shade Cord, &amp;c.:

White Cotton, No. 3 1/2, \$1.50; No. 4,

\$2.00; No. 4 1/2, \$2.50; Colors, No. 3 1/2,

\$1.75; No. 4, \$2.25; No. 4 1/2, \$2.75;

Linen, No. 3 1/2, \$2.50; No. 4, \$3.50;

No. 4 1/2, \$4.50.....20%

Tent and Awning Lines: No. 5,

White Cotton, \$7.50; Drab Cotton,

\$8.50.....20%

Clothes Lines, White Cotton, 50 ft.,

\$2.75; 60 ft., \$3.25; 70 ft., \$3.75; 75

ft., \$4.00; 80 ft., \$4.25; 90 ft., \$4.75;

100 ft., \$5.25.....20%

**Locks—Cabinet—**

Cabinet Locks.....\$3 1/2 to \$5 1/2&amp;7 1/2%

**Door Locks, Latches, &c—**

NOTE.—Net Prices are very often made

on these goods.

Reading Hardware Co.....40%

R. &amp; E. Mfg. Co.....10%

**Elevator—**

Stowell's.....50%

**Padlocks—**

R. &amp; E. Mfg. Co. Wrought Steel and

Brass.....75&amp;10%

**Sash, &c.—**Ives' Patent:  
Bronze and Brass, 60%; Crescent,

40&amp;20%; Iron, 60%; Window Ven-

tilating, 55%; Robinson Pat. Ven-

tilating Sash Lock, 35%; Wrought

Bronze and Brass, 55%; Wrought

Steel, 55%.

Pullman Patent Ventilating Lock.....35%

Reading.....40%

**Machines—Boring—**

Com. Up'r, without Augers.....

\$2.00 to \$2.25

Com. Ang'l'r, without Augers.....

\$2.25 to \$2.50

Swan's Improved.....40&amp;10%

Jennings', Nos. 1 and 1.....35%

Millers' Falls.....5.75

Snell's, Upright, \$2.65; Angular, \$2.90

**Corking—**

Reisinger Inevitable Hand Power.....

\$48.00

**Fence—**

Williams' Fence Machines.....each, \$5.50

**Hoisting—**

Moore's Anti-Friction Differential

Pulley Block.....30%

Moore's Hand Hoist, with Lock

Brake.....20%

Moore's Cyclone High Speed Chain

Hoist.....25%

**Potato—**  
Saratoga ..... 50 doz. \$7.00  
White Mountain ..... 50 doz. \$6.00

**Picks and Mattocks—**  
List, Feb. 23, 1899 ..... 70¢10¢75¢  
Cronk's Handled Garden Mattock,  
50 doz., No. 2, \$2.60; No. 3, \$3.40.

**Pinking Irons—**  
See Irons, Pinking.

**Pins, Escutcheon—**  
Brass ..... 60¢10¢60¢  
Iron, list Nov. 11, '85 ..... 60¢10¢10¢

**Pipe, Cast Iron Soil—**  
Carload lots.  
Standard, 2-6 in. 50¢10¢50¢10¢45¢  
Extra Heavy, 2-6 in. .... 65¢10¢  
Fittings ..... 70¢10¢70¢10¢45¢

**Pipe, Merchant—**  
Consumers, Carloads.  
Steel ..... 70¢  
Blk. Galv. Blk. Galv.  
1/2 & 3/4 in. .... 68 52 64.5 48.5  
3/4 in. .... 70 56 64.5 56.5  
1 in. .... 72 60 72.5 62.5  
1 1/2 to 6 in. .... 76 66 72.5 62.5  
7 to 12 in. .... 71 66 68 53

**Pipe, Vitrified Sewer—**  
Carload lots.  
Standard Pipe and Fittings, 3  
to 24 in., f.o.b. factory:  
First-class ..... 85¢86¢  
Second-class ..... 90¢  
NOTE.—Market irregular.

**Pipe, Stove—**  
Per 100 joints.  
Edwards' Nested: C. L. L. C. L.  
5 in., Standard Blue ..... \$6.25 \$7.25  
6 in., Standard Blue ..... 6.75 7.75  
7 in., Standard Blue ..... 7.75 8.75  
5 in., Royal Blue ..... 7.00 8.00  
6 in., Royal Blue ..... 7.50 8.50  
7 in., Royal Blue ..... 8.50 9.50

**Planes and Plane Irons—**  
Wood Planes—  
Bench, first qual. .... 35¢35¢10¢  
Bench, second qual. .... 45¢45¢10¢  
Molding ..... 30¢30¢10¢  
Bailey's (Stanley R. & L. Co.) ..... 35¢24¢  
Chapin-Stephens Co.:  
Bench, First Quality ..... 35¢  
Bench, Second Quality ..... 45¢  
Molding and Miscellaneous ..... 30¢  
Toy and German ..... 35¢  
Union ..... 60¢

**Iron Planes—**  
Bailey's (Stanley R. & L. Co.) ..... 35¢  
Chapin's Iron Planes ..... 30¢10¢  
Miscellaneous Planes (Stanley R. & L. Co.) ..... 30¢5¢  
Union ..... 60¢

**Plane Irons—**  
Wood Bench Plane Iron ..... 25¢25¢10¢  
Buck Bros. .... 30¢  
Chapin-Stephens Co. .... 25¢  
Stanley R. & L. Co. .... 35¢  
Union ..... 50¢  
L. & J. White ..... 20¢5¢25¢

**Planters, Corn, Hand—**  
Kohler's Eclipse ..... 50 doz. \$3.00

**Plates—**  
Felloe ..... 10 lb. 4¢4¢  
Self-Sealing Pie Plates (R. M. Co.) ..... 50 doz. \$2.00

**Pliers and Nippers—**  
Button Pliers ..... 75¢10¢75¢ 20. 5¢  
Gas Cutter, per doz., 5 in. \$1.25  
@ \$1.30; 6 in., \$1.45 @ \$1.50.  
Gas Pipe, 7 1/2 10 12 in.  
\$2.00 \$2.25 \$2.75 \$3.50

**Acme Nippers—**  
Cronk & Carrier Mfg. Co.:  
American Button ..... 75¢10¢  
Cronk's ..... 60¢  
Stub's Pattern ..... 100¢  
Combination and others ..... 35¢  
Heller's Farmers' Nippers, Pincers  
and Tools ..... 40¢5¢10¢45¢  
The Nettleton Mfg. Co. Reversible  
Cutting Nippers ..... 40¢  
P. S. & W. Timmers' Cutting Nip-  
pers ..... 60¢  
Wm. Schollhorn Co.:  
Bernard, 33 1/2%; Elm City, 33 1/2%;  
Paragon, 50%; Lodi, 50%;  
Swedish Side, End and Diagonal Cut-  
ting Pliers ..... 50¢  
Utica Drop Forge & Tool Co.:  
Pliers and Nippers, all kinds ..... 60¢

**Plumbs and Levels—**  
Chapin-Stephens Co.:  
Plumbs and Levels ..... 30¢30¢10¢5¢  
Chapin's Imp. Brass Cor. 40¢40¢10¢  
Pocket Levels ..... 30¢30¢10¢45¢  
Extension Sights ..... 40¢40¢10¢  
Machinists' Levels ..... 40¢40¢10¢  
Diston's Plumbs and Levels ..... 35¢  
Diston's Pocket Levels ..... 35¢  
C. E. Jennings & Co.'s Iron, Adjust-  
able ..... 40¢7¢  
Stanley R. & L. Co. .... 40¢  
Stanley's Duplex ..... 30¢  
Woods' Extension ..... 35¢

**Poachers, Egg—**  
Buffalo Steam Egg Poachers, 50 doz.,  
No. 1, \$6.00; No. 2, \$3.00; No. 3,  
\$3.00; No. 4, \$12.00 ..... 50¢

**Points, Glaziers—**  
Bulk and 1-lb. papers, ..... 10¢ 10¢  
14-lb. papers, ..... 10¢ 10¢10¢  
1/4-lb. papers, ..... 10¢ 10¢11¢

**Pokes, Animal—**  
Ft. Madison Hawkeye ..... 50 doz. \$3.25  
Ft. Madison Western ..... 50 doz. \$4.00

**Police Goods—**  
Manufacturers' Lists ..... 25¢25¢45¢  
Tower's ..... 25¢

**Polish—Metal, Etc—**  
Glasbrite, No. 2, 5 lb can (powder),  
each, \$1.25; 50 doz., \$12.00; No. 2, 10 lb  
can (cake), each, \$2.50; 50 doz., \$24.00.  
Prestoline Liquid, No. 1 (1/4 pt.),  
doz., \$3.00; No. 2 (1 qt.), \$5.00; 40¢  
Prestoline Paste ..... 40¢  
George William Hoffman:  
U. S. Metal Polish Paste, 3 oz.  
boxes, 50 doz. \$6.00; 50 gro. \$4.50.  
1 lb boxes, 50 doz. \$1.25; 1 lb  
boxes, 50 doz. \$1.25.  
U. S. Liquid, 8 oz. cans, 50 doz.,  
\$1.25.  
Barkeepers' Friend Metal Polish, 50  
doz., \$1.75.

**Stove—**  
Black Eagle Benzine Paste, 5 lb cans,  
50 doz. \$1.00; 1 lb cans, 50 doz. \$1.00  
Black Eagle, Liquid, 1/4 pt. cans,  
50 doz. \$1.00  
Black Jack Paste, 1/4 lb cans, 50 doz. \$1.00  
Black Kid Paste, 5 lb cans, each, \$0.65  
Ladd's Black Beauty Liquid, per  
100 tins ..... \$6.75  
Joseph Dixon's, 50 gr. \$3.75 ..... 10¢  
Dixon's Plumbago ..... 10¢  
Fireside ..... 10¢  
Gem, 50 gr. \$1.50 ..... 10¢  
Japanese ..... 10¢  
Jet Black ..... 10¢  
Peelless Iron Enamel, 10 oz. cans,  
50 doz. \$1.50

Wynn's Black Shik:  
Paste, cans, 50 doz., 5 oz., \$0.75;  
1/2 lb, \$1.00; 1 lb, \$1.25  
Paste, 5 lb cans, 50 doz. \$0.70  
Liquid, cans, 50 doz., 6 oz., \$0.75;  
1/2 pt., \$1.00; 1 pt., \$1.25  
Steel Range Enamel, 50 doz., 1/4 pt.,  
\$1.00; 1/2 pt., \$1.25.

**Poppers, Corn—**  
1 qt. Square ..... gro. \$8.50  
1 qt., Round ..... gro. \$9.50  
1/2 qt., Square ..... gro. \$10.50  
2 qt., Square ..... gro. \$12.50

**Post Hole and Tree Au-  
gers and Diggers—**  
See also Diggers, Post Hole, &c.

**Posts, Steel—**  
Steel Fence Posts, each, 5 ft., 42¢;  
5 ft., 46¢; 6 1/2 ft., 45¢.  
Steel Hitching Posts ..... each \$1.30

**Potato Parers—**  
See Parers, Potato.

**Pots, Glue—**  
Enameled ..... 30¢10¢  
Tinned ..... 35¢10¢

**Powder—**  
In Canisters:  
Duck, 1 lb ..... each 45¢  
Fine Sporting, 1 lb ..... each 75¢  
Rifle, 1/2 lb ..... each 15¢  
Rifle, 1 lb ..... each 25¢

**In Kegs:**  
12 1/2 lb. kegs ..... \$3.50  
25 lb. kegs ..... \$4.50  
King's Semi-Smokeless:  
Keg (25 lb bulk) ..... \$6.50  
Half Keg (12 1/2 lb bulk) ..... \$3.50  
Quarter Keg (6 1/4 lb bulk) ..... \$1.90  
Case 24 (1 lb cans bulk) ..... \$4.50  
Half case (1 lb cans bulk) ..... \$4.50  
King's Smokeless: Shot Gun, Rifle,  
Keg (25 lb bulk) ..... \$12.00 \$15.00  
Half Keg (12 1/2 lb bulk) ..... 8.25 7.75  
Quarter Keg (6 1/4 lb bulk) ..... 3.25 4.00  
Case 24 (1 lb cans bulk) ..... 14.00 17.00  
Half case 12 (1 lb c. bk.) ..... 7.25 8.75  
Robin Hood Smokeless Shot Gun ..... 50¢20¢

**Presses—**  
Fruit and Jelly—  
Enterprise Mfg. Co. .... 20¢25¢  
Seal Presses—  
Morrill's No. 1, 50 doz., \$20.00 ..... 50¢

**Pruning Hooks and Shears**  
See Shears.

**Pullers, Nail—**  
Cyclops ..... 50¢  
Miller's Puller, No. 3, 50 doz., \$12.00 ..... 33 1/2%  
Morrill's No. 1, Nail Puller, 50 doz.  
\$20.00 ..... 50¢  
Pearson No. 1, Cyclone Spike Puller,  
each \$30.00 ..... 50¢  
Scranton, Case Lots:  
No. 2B (large) ..... \$5.50  
No. 3B (small) ..... \$5.00  
Smith & Hemenway Co.:  
Diamond B, case lots, 50 doz., Large,  
\$3.00; Small, \$2.50.  
Giant No. 1, 50 doz., \$18; No. 1 1/2,  
\$16.50; No. 3, \$15 ..... 33 1/2%  
Staple Pullers, Utica and Davi-  
son ..... 60¢  
Parrot Tack and Stub Puller, 50 doz.,  
75c; 50 gro., \$6.00

**Pulleys, Single Wheel—**  
Inch ..... 1 1/2 1 1/4 1 1/2 1 3/4  
Acuting or Tackle,  
doz. .... \$0.30 .45 .60 1.05  
Hay Fork, Steel or Solid Eye,  
doz., 4 in., \$1.25; 5 in., \$1.55  
Inch ..... 1 1/2 1 1/4 1 1/2 1 3/4  
Hot House, doz. .... \$0.85 .85 1.25  
Inch ..... 1 1/2 1 1/4 1 1/2 1 3/4  
Screw, doz. .... \$0.16 .16 .30 .30  
Inch ..... 1 1/2 1 1/4 1 1/2 1 3/4  
Side, doz. .... \$0.25 .25 .55 .60  
Inch ..... 1 1/2 1 1/4 1 1/2 1 3/4  
Stowell's:  
Casting or End, Anti-Friction, 60¢10¢  
Dumb Waiter, Anti-Friction, 60¢10¢  
Electric Light ..... 60¢  
Side, Anti-Friction ..... 60¢10¢

**Sash Pulleys—**  
Common Frame; Square or  
Round End, per doz, 1 1/4 and  
3 in. .... 16¢10¢  
Auger Mortise, no Face Plate,  
per doz., 1 1/4 and 2 in. .... 17¢10¢  
Acme ..... 1 1/4 in., 16¢; 2 in., 19¢  
Fox-All-Steel, Nos. 3 and 1, 3 in. .... 50¢

Grand Rapids All Steel Noiseless ..... 50%  
Ideal ..... 70¢45¢  
Niagara ..... 1 1/4 in., 16¢; 2 in., 19¢  
No. 20, Troy, 1 1/4 in., 14¢; 2 in., 16¢  
Star ..... 1 1/4 in., 16¢; 2 in., 19¢  
Tackle Blocks—See Blocks.

**Pumps—**  
Cistern ..... 60¢  
Pitcher Spout ..... 75¢10¢75¢10¢  
Wood Pumps, Tubing, &c. 45¢45¢  
Barnes Dbl. Acting (low list) ..... 50¢  
Barnes' Pitcher Spout ..... 75¢10¢45¢  
Contractors' Rubber Diaphragm No.  
2, B. & L. Block Co. .... \$16.00  
Daisy Spray Pump ..... 50 doz. \$6.50  
Flint & Walling's, Fast Mail Hand,  
(low list) ..... 55¢  
Flint & Walling's Fast Mail (low  
list) ..... 55¢  
Flint & Walling's Tight Top Pitcher,  
75¢10¢45¢  
National Specialty Mfg. Co. Measur-  
ing, Nos. 2, \$6.00; 3, \$5.50 ..... 30¢  
Myers' Pumps (low list) ..... 50¢  
Myers' Pumps ..... 50¢  
Myers' Spray Pumps ..... 50¢

**Pump Leathers—**  
Plunger and Lower Valve—Per  
gro.:  
Inch ..... 2 1/2 2 1/4 2 1/2 2 3/4  
Inch ..... \$2.20 2.50 2.75 3.00  
Inch ..... \$3.30 3.60 3.85 4.10 4.40

**Plunger Cup Leathers—Per 100:**  
Inch ..... 2 1/2 2 1/4 2 1/2 2 3/4  
Inch ..... \$2.75 3.85 5.00 6.00

**Punches—**  
Saddlers' or Drive, good ..... doz. 50¢75¢  
Spring, single tube, good qual-  
ity ..... \$1.75\$2.00

**Revolving (4 tubes)** doz. \$3.50\$3.75  
Bemis & Call Co.'s Cast Stl Drive ..... 50¢  
Morrill's No. 1AA, 1A, 1B, 1C,  
15.00 ..... 50¢  
Hercules, 1 die, each \$5.00 ..... 50¢  
Niagara Hollow Punches ..... 40¢  
Niagara Solid Punches ..... 55¢10¢  
Wm. Schollhorn Co.:  
Barn and Ticket, Bernard, 33 1/2%;  
Paragon, 50%; Lodi, 50%;  
Timmers' Hollow P., S. & W. Co. 33 1/2%  
Timmers' Solid, P., S. & W. Co. 50  
doz., \$1.44 ..... 50¢

**Rail—Barn Door, &c.—**  
Sliding Door, Painted Iron ..... 2 1/2\$2 1/2\$2 1/2\$2 1/2

**Sliding Door, Wrought Brass,**  
1 1/4 in., lb., 36¢ ..... 30¢  
Allitt Mfg. Co.: Reliable Hanger ..... 50¢  
Cronk's:  
Double Braced Steel Rail, 50 ft. 2 1/2¢  
O. N. T. Rail ..... 2 1/2¢  
Griffin's:  
xxx, 100 ft., 1 x 3-16 in., \$3.00;  
1 1/4 x 3-16 in., 3.50  
Standard, 100 ft., 1 x 3-16  
in., \$3.10; 1 1/4 x 3-16 in., \$3.80.  
Lane's:  
Hinged Track, 100 ft., 1 in., \$3.40;  
1 1/4 in., \$3.96.  
O. N. T., 100 ft., 1 in., \$3.00; 1 1/4  
in., \$3.60; 1 1/2 in., \$4.00.  
Standard, 100 ft., 1 in., \$3.00;  
Lawrence Bros.:  
100 ft., No. 201, \$4.00; No. 202, \$4.00  
New York, 1 x 3-16 in., 100 ft. \$3.00  
McKinney's:  
Hinged Hanger Rail, 50 ft., 1 1/2¢ ..... 50¢  
None Better ..... 50¢  
Standard ..... 50¢  
Myers' Stayon Track ..... 60¢10¢  
Richards' Mfg. Co.:  
Common, 1 x 3-4 in., \$3.00; 1 1/4  
x 3-16, \$3.25; 1 1/2 x 3-16, \$3.50.  
Special Hinged Hanger Rail ..... 60¢10¢  
Lag Screw Rail, No. 65 ..... 50¢  
Gauge Trolley Track, 50 ft., No. 31,  
3¢; No. 32, 1 1/2¢; No. 33, 2¢.  
No. 30 ..... 60¢10¢  
No. 61, \$3.00; 62, \$3.25; 63, \$3.50; 64,  
\$4.00; 65, \$3.25; 66, \$3.50; 69, No. 1,  
\$3.25; 69, No. 2, \$3.50.

**Stowell's:**  
Case Rail ..... 50 ft. 2 1/2¢  
Steel Rail, Plain ..... 2 1/2¢  
Wrought Bracket, 1 x 3-16 in., 50 ft. 3¢  
Wrought Bracket, 1 1/4 x 3-16, 50 ft. 7¢  
Srett's Hylro, 50 ft. 11¢ ..... 60¢  
P. L. B. Steel Rail ..... 100 ft. \$3.00  
No. 0, 1 x 3-16 ..... 100 ft. \$3.00

**Rakes—**  
NOTE.—Many goods are sold  
at net prices.  
Fort Madison Red Head Lawn ..... \$3.25  
Fort Madison Blue Head Lawn ..... \$2.70  
Jackson Lawn, 25 and 30 teeth, 50  
doz., net ..... \$1.25  
Cronk's:  
New Champion Garden, 50 doz., 12  
teeth, \$15.00; 14, \$16.50; 16, \$18.00. 75¢  
Victor Garden, 50 doz., 12 teeth,  
\$15.00; 14, \$16.50; 16, \$18.00. 80¢  
Queen City Lawn, 50 doz., 20 teeth,  
\$2.85; 24, \$3.00 ..... net  
Anticlog Lawn, 50 doz. .... \$1.00  
Malleable Garden, 50 doz. .... \$1.00  
Ideal Steel Garden, 50 doz., 12 teeth,  
\$15.00; 14, \$16.00; 16, \$18.00. 60¢  
Kohler's:  
Lawn Queen, 20-tooth ..... 50 doz. \$2.90  
Lawn Queen, 24-tooth ..... 50 doz. \$3.00  
Paragon, 20-tooth ..... 50 doz. \$2.70  
Paragon, 24-tooth ..... 50 doz. \$2.75  
Steel Garden, 14-tooth ..... 50 doz. \$2.40  
Malleable Garden, 14-tooth, 50 doz.  
\$1.75\$2.00

**Rasps, Horse—**  
Diston's ..... 75¢  
Heller Bros. .... 70¢45¢10¢45¢  
Liverlight Bros.' Gold Medal ..... 70¢10¢75¢  
New Nicholson ..... 70¢10¢75¢  
See also Files.

**Razors—**  
Liana Ro-rasle ..... 60¢  
Fox Razors, 50 doz., No. 42, \$8.00; }  
No. 44, \$30.00; No. 82, Platina. } 25¢  
Res. No. .... }  
Red Devil ..... 50¢

Silberstein:  
Carbo Magnetic, \$21.00; Griffon, No. 65,  
\$13.50; Griffon, No. 60, \$12.00;  
all other Razors, 40¢.

**Safety Razors—**  
Kampfe Bros.:  
Star Safety, 25¢; Star Interchange-  
able, 25¢; Star Safety Corn, 25¢.  
Silberstein ..... 40¢

**Reels, Fishing—**  
Hendryx:  
M & Q, A, B, C, M, 16,  
M, Q, A, B, 16, 4008, Rubber,  
Populo, Nickered Populo, ..... 20¢  
Aluminum German Mill, Bronze, 25¢  
1240 N., 124 N. .... 20¢  
3001 N., 06 N., 6 RM, G ..... 25¢  
4 N., 6 PN, 21 N., 36 PN ..... 20¢  
2904 P., 33 1/4%; 2904 PN, 33 1/4%; 0294,  
33 1/4%; 02084 N., 33 1/4%; 02504 PN,  
33 1/4%; 802 N., 33 1/4%  
986 PN, 2304 N., 974 PN ..... 25¢  
5009 PN, 5009 N. .... 20¢  
Competitor, 102 P., 102 PN, 202 P.,  
202 PN, 102 PH, 202 PH ..... 20¢  
304 P., 304 PN, 00304 P., 00304 PN, 33 1/4%

**Registers—List July 1, 1903.**  
Japanned, Electroplated and  
Bronzed ..... 70¢  
White Porcelain Enamel ..... 60¢  
Solid Brass or Bronze Metal, 40¢10%

**Revolvers—**  
Single Action ..... 95¢\$1.00  
Double Action, except 44 cal. \$1.85  
Double Action, 44 caliber ..... \$2.00  
Automatic ..... \$3.25  
Hammerless ..... \$3.75

**Riddles, Hardware Grade**  
26 in. .... per doz. \$2.50\$3.25  
27 in. .... per doz. \$2.75\$3.00  
28 in. .... per doz. \$3.00\$3.25

**Rings and Ringers—**  
Bull Rings—  
Steel ..... \$2 2 1/2 3 inch.  
Copper ..... \$1.00 1.15 1.40 doz.  
Rea's Improved Self-Piercing, 50 doz.,  
Copper, 2 in., \$1.25; 2 1/2 in., \$1.50;  
3 in., \$1.75.

**Hog Rings and Ringers—**  
Hill's Rings, gro. boxes \$1.00\$1.50  
Hill's Ringers, Gray Iron ..... doz. 50¢55¢  
Hill's Ringers, Malleable Iron ..... doz. 70¢75¢

**Blair's Rings** per gro. \$1.75\$2.25  
Blair's Ringers, per doz. \$0.60\$0.65  
Brown's Rings, per gro. \$5.00\$5.50  
Brown's Ringers, per doz. \$0.60\$0.65

**Rivets and Burrs—**  
Copper ..... 40¢8 1/2%  
Carriage, Coopers', Timmers, &c.:  
Black ..... 70¢10¢  
Metallic Tinned ..... 70¢  
Bifurcated and Tubular—  
Assorted in Boxes.  
Bifurcated, per doz. boxes, paste-  
board boxes, 23¢25¢; Tin boxes,  
29¢32¢.  
Tubular, per doz. boxes, 50 count,  
72¢; 100 count, 51¢58¢.

**Rollers—**  
Acme, Stowell's Anti-Friction, 50%  
Cronk's Stay No. 65, \$0.90; No. 60  
50 ..... \$1.00  
Cronk's Brinkerhoff No. 55, \$0.60;  
No. 56 ..... \$0.84  
Lane's Stay ..... 40¢  
Richards' Stay:  
Handy, Adj. and Reversible No. 53.75¢  
O. K. Adj. and Reversible No. 58.50¢  
Lag Screw, Nos. 55 and 57 ..... 50¢  
Underwriters', Nos. 50, 60 ..... 50¢  
Favorite, No. 54 ..... 60¢  
Stowell's Barn Door Stay, 50 doz. \$1.00  
Swett's Anti-Friction ..... 50¢  
Screw and Spike Stay, 50 doz. 60¢  
Hinge Adjustable Stay, 50 doz. 90¢

**Rope—**  
Manila, 7-16 in. diam. and larger:  
Pure ..... lb. 12 1/2¢13¢  
Sisal, 7-16 in. diam. and larger:  
Pure ..... lb. 9 1/2¢  
Sisal, 7-16 in. diam. and larger:  
No. 2 quality ..... lb. 8¢  
Sisal, Hay, Hide and Bale  
Ropes, Medium and Coarse:  
Mixed ..... lb. 8¢  
Pure ..... lb. 9 1/2¢  
Sisal, Tarred, Medium and  
Yarn, Coarse and Untarred:  
Mixed ..... lb. 7 1/2¢7 1/4¢  
Pure ..... lb. 8¢  
Cotton Rope:  
Best, 1/4-in. and larger ..... 17¢18¢  
Medium, 1/4-in. and larger ..... 16¢17¢  
Common, 1/4-in. and larger ..... 10¢  
In coils, 1/2¢ advance.

**Wire Rope—**  
Galvanized ..... 37 1/4¢21 1/2¢  
Plain ..... 35¢21 1/2¢  
Ropes, Hammock—  
Covert Mfg. Co.:  
Jute, 35%; Sisal ..... 20¢

**Rules**  
Boxwood ..... 60¢60¢10¢  
Ivory ..... 35¢10¢35¢10¢45¢  
Chapin-Stephens Co.:  
Boxwood ..... 60¢  
Flexfold ..... 27 1/2¢10¢10¢  
Irony ..... 25¢35¢10¢10¢  
Miscellaneous ..... 25¢35¢10¢10¢  
Stephens' Combination ..... 35¢35¢10¢  
Stationers' ..... 10¢10¢10¢



**Scythe Stones—**

Chicago Wheel & Mfg. Co.	
Gem Corundum 10 in.	\$8.00
gro. 12 in.	\$10.80
Norton Alundum Scythe Stones:	
Less than 10 gross lots.	per doz. \$4.00
Lots of 10 gross or more.	per doz. \$4.50
Pike Mfg. Co., 1901 list:	
Black Diamond S. S.	per doz. \$12.00
Lamotte S. S.	per doz. \$11.00
White Mountain S. S.	per doz. \$9.00
Green Mountain S. S.	per doz. \$6.00
Extra Indian Pond S. S.	per doz. \$7.50
No. 1 Indian Pond S. S.	per doz. \$7.00
No. 2 Indian Pond S. S.	per doz. \$4.50
Leader Red End S. S.	per doz. \$4.50
Quick Cut Emery.	per doz. \$10.00
Pure Corundum.	per doz. \$18.00
Crescent.	per doz. \$7.00
Emery Scythe Rifles.	3 Coats. \$11.00
Emery Scythe Rifles.	4 Coats. \$12.00
Balance of 1904 list 33 1/2%	

**Stoppers, Bottle—**

Victor Bottle Stoppers.	per doz. \$9.00
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**Stops—Bench—**

Millers Falls.	per doz. \$15.10
Morrill's, No. 1.	per doz. \$10.00
Morrill's, No. 2.	per doz. \$12.50

**Door—**

Chapin-Stephens.	per doz. \$40.00
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**Plane—**

Chapin-Stephens.	per doz. \$20.00
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**Straps—Box—**

Cary's Universal, case lots.	per doz. \$20.10
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**Stretchers, Carpet—**

Cast Iron, Steel Points, doz.	\$60.00
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**Socket—**

Bullard, per doz.	\$41.00
Excelsior Stretcher and Tack Hammer Combined, per doz.	\$60.00

**Strops, Razor—**

Star Diagonal Strop.	per doz. \$25.00
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**Stuffers, Sausage—**

Enterprise Mfg. Co.	per doz. \$25.75
National Specialty Co., list Jan. 1, 1902.	per doz. \$30.25

**Sweepers, Carpet—**

National Sweeper Co.	per doz. \$120.00
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Louis XV, Roller Bearing, Gold Plated.	\$120.00
Hepplewhite, Roller Bearing, Silver Plated.	\$72.00
Sheraton, Roller Bearing, N'kel.	\$80.00
Ye Minster, Roller Bearing, Oil-dized Coppered.	\$36.00
Transparent, Roller Bearing, Plate Glass top, Nickelized.	\$36.00
National Queen, Roller Bearing, Fancy Veneers.	\$22.00
Loyal, Roller Bearing, Veneers, Nickelized.	\$25.00
Triple Medal, Roller Bearing, Nickelized.	\$24.00
Marion, Roller Bearing, N'kel.	\$24.00
Marion Queen, Roller Bearing, Nickelized.	\$24.00
Monarch, Roller Bearing, N'kel.	\$22.00
Monarch, Roller Bearing, Jap.	\$20.00
Perpetual, Regular B'g, N'kel.	\$20.00
Perpetual, Regular B'g, Jap.	\$18.00
Monarch Extra (17 in. case), Roller Bearing, Nickelized.	\$36.00
Monarch Extra (17 in. case), Roller Bearing, Japanned.	\$33.00
Auditorium (25 in. case), Roller Bearing, Nickelized.	\$54.00
Mammoth (25 in. case), Roller Bearing, Nickelized.	\$60.00

<b>NOTE—Rebates: 50c per dozen on three-dozen lots; \$1 per dozen on five-dozen lots; \$2 per dozen on ten-dozen lots; \$2.50 per dozen on twenty-five-dozen lots.</b>	
Streator Metal Stamping Co.	
Eureka Japanned.	per doz. \$15.00
Model A, Sanitaire.	per doz. \$25.00
Model A, Sterling.	per doz. \$25.00
Model B, Sterling, Nickelized.	per doz. \$25.00
Model B, Sterling, Japanned.	per doz. \$21.00
Model C, Sterling.	per doz. \$21.50
Model D, Sterling.	per doz. \$19.50

**Tacks, Finishing Nails, &c.**

<b>New List, May 1, 1905.</b>	
American Carpet Tacks.	per doz. \$90.35
American Cut Tacks.	per doz. \$90.35
Swedes Cut Tacks.	per doz. \$90.35
Swedes Upholsterers.	per doz. \$90.35
Gimp Tacks.	per doz. \$90.45
Lace Tacks.	per doz. \$90.45
Trimmers' Tacks.	per doz. \$90.35
Looking Glass Tacks.	per doz. \$65.00
Bill Posters' and Railroad Tacks.	per doz. \$90.45
Hungarian Nails.	per doz. \$80.20
Finishing Nails.	per doz. \$70.00
Trunk and Clout Nails.	per doz. \$80.00

**NOTE—**The above prices are for Standard Weights. An extra 5% is given on Medium Weights, and an extra 10% is given on light weights.

**Miscellaneous—**

Double Pointed Tacks.	per doz. \$90.45 or 5 tons
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**Tanks, Oil—**

Emerald, R. M. Co.	per gal. \$3.40
Emerald, R. M. Co.	per gal. \$1.25
Queen City, R. M. Co.	per gal. \$3.65
Queen City, R. M. Co.	per gal. \$4.50

**Tapes, Measuring—**

American Ases' Skin.	per yd. \$5.00
Patent Leather.	per yd. \$3.65
Steel.	per yd. \$3.45
Chesterman's.	per yd. \$3.65
Keuffel & Esser Co.	per yd. \$4.00
Favorite, A. Skin.	per yd. \$10.50
Favorite, Duck and Leather.	per yd. \$25.50
Metallic and Steel, lower list.	per yd. \$3.50
Lufkin's.	per yd. \$4.00
Ases' Skin.	per yd. \$4.00

Metallic.	per doz. \$30.45
Patent Bend, Leather.	per doz. \$25.45
Pocket.	per doz. \$24.45
Steel.	per doz. \$34.45

**Wienbusch & Hilger:**

Chesterman's Metallic, No. 34L.	per doz. \$25.00
Chesterman's Steel, No. 1038L.	per doz. \$25.00

**Teeth, Harrow—**

Steel Harrow Teeth, plain or headed, 1/2-inch and larger.	per 100 lbs. \$2.75 to \$3.00
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**Thermometers—**

Tin Case.	per doz. \$8.00 to \$10.00
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**Ties, Bale—Steel Wire—**

Single Loop.	per doz. \$8.00
Monitor, Cross Head, do.	per doz. \$7.00

**Brick Ties—**

Niagara Brick Ties.	per doz. \$3.10
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**Tinners' Shears, &c.—**

See Shears, Tinners', &c.	
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**Tinware—**

Stamped, Japanned and Pieced, sold very generally at net prices.	
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**Tire Benders, Upsetters, &c.—**

See Benders and Upsetters, &c.	
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**Tools—Coopers—**

L. & I. J. White.	per doz. \$20.45
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**Hay—**

Myers' Hay Tools.	per doz. \$50.00
Stowell's Hay Carriers.	per doz. \$50.00
Forbes, Fork Pullers.	per doz. \$50.00

**Miniature—**

Smith & Hemenway Co.'s, Davidson.	per doz. \$25.00
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**Saw—**

Atkins' Cross Cut Saw Tools.	per doz. \$40.00
Simonds' Improved.	per doz. \$35.00
Simonds' Crescent.	per doz. \$25.00

**Ship—**

L. & I. J. White.	per doz. \$25.00
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**Transom Lifters—**

See Lifters, Transom.	
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**Traps—Fly—**

Balloon, Globe or Acme, doz.	\$1.15 to \$1.25
Harper, Champion or Paragon, doz.	\$1.25 to \$1.40
Imitation Onclous.	per doz. \$75.00
Newhouse.	per doz. \$35.00
Hawley & Norton.	per doz. \$65.00
Victor.	per doz. \$70.00
Onclous Community Jump.	per doz. \$50.00

**Mouse and Rat—**

Mouse, Wood, Choker, doz. holes.	\$8.00
Mouse, Round or Square Wire.	per doz. \$5.00
Marty French Hat and Mouse Trap (Genuine).	per doz. \$13.25
No. 1, Rat, per doz.	\$13.25
No. 2, Rat, per doz.	\$11.50
No. 3, Rat, per doz.	\$6.50
No. 4, Rat, per doz.	\$5.75
No. 5, Rat, per doz.	\$4.75
No. 6, Mouse, per doz.	\$3.00
No. 7, Mouse, per doz.	\$3.00
Trimmers, Spoke.	per doz. \$2.25

**Trowels—**

Diston Brick and Pointing.	per doz. \$25.00
Diston Plastering.	per doz. \$25.00
Diston "Standard Brand" and Garden Trowels.	per doz. \$30.00
Kohler's Steel Garden Trowels, per doz.	\$5.00
5 in., \$4.00; 6 in., \$5.00.	
Never-Break Steel Garden Trowels.	per doz. \$5.00

**Trucks, Warehouse, &c.—**

B. & L. Block Co.	
New York Pattern.	per doz. \$50.10
Western Pattern.	per doz. \$60.10
Handy Trucks.	per doz. \$16.00
Grocery.	per doz. \$15.00
Day Stove Trucks, Improved Pattern.	per doz. \$18.50
McKinney Trucks.	per doz. \$18.50
Model Stove Trucks.	per doz. \$18.50

**Tubs, Wash—**

Marty French Rat and Mouse Traps		
(Genuine):		
No. 1	2	3
20	25	\$12.00
per doz.		

**Twine, Miscellaneous—**

Flax Twine:	
No. 9, 1/4 and 1/2-lb. Balls.	per doz. \$2.25
No. 12, 1/4 and 1/2-lb. Balls.	per doz. \$2.10
No. 18, 1/4 and 1/2-lb. Balls.	per doz. \$1.95
No. 24, 1/4 and 1/2-lb. Balls.	per doz. \$1.80
No. 36, 1/4 and 1/2-lb. Balls.	per doz. \$1.75
Chalk Line, Cotton 1/4-lb. Balls.	per doz. \$3.00
Cotton Mops, 6, 8, 12 and 15 lb. to doz.	\$10.00 to \$15.00
Cotton Wrapping, 5 Balls to lb., according to quality.	per lb. \$1.25 to \$2.25
American 2-Ply Hemp, 1/4 and 1/2-lb. Balls.	per doz. \$13.25 to \$14.50
American 3-Ply Hemp, 1-lb. Balls.	per doz. \$14.50 to \$15.50
India 2-Ply Hemp, 1/4 and 1/2-lb. Balls (Spring Twine).	per doz. \$9.50 to \$10.50
India 3-Ply Hemp, 1-lb. Balls.	per doz. \$9.50 to \$10.50
India 3-Ply Hemp, 1 1/2-lb. Balls.	per doz. \$9.50 to \$10.50
2, 3, 4 and 5-Ply Jute, 1/2-lb. Balls.	per doz. \$11.00 to \$12.00
Mason Line, Linen, 1/2-lb. Bils.	per doz. \$1.45
No. 24 Mattress, 1/4 and 1/2-lb. Balls, according to quality.	per doz. \$30.00 to \$40.00
Wool, 8 to 6 ply.	per 7 1/2 yd. \$4.00

**Vises—**

Solid Box.	per doz. \$60.00
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**Parallel—**

Athol Machine Co.	
Simpson's Adjustable.	per doz. \$40.00
Standard.	per doz. \$40.00
Amateur.	per doz. \$40.00
Columbian Hdw. Co.	per doz. \$40.00
Emmert Universal.	per doz. \$40.00
Pattern Makers' No. 1.	per doz. \$15.00
No. 2.	per doz. \$12.50
Machinist and Tool Makers' No. 4.	per doz. \$12.50
No. 6A.	per doz. \$10.00
No. 10A.	per doz. \$22.50
Presto Quick Acting Adjustable Jaw.	per doz. \$25.00 to \$40.00
Tiger Machinists.	per doz. \$35.00 to \$40.00
Flisher & Norris Double Screw, net, each.	Nos. 2, \$10.00; 3, \$16.00; 4, \$20.00; 5, \$27.00.
Holland's.	
Machinists'.	per doz. \$10.00 to \$15.00
Keystone.	per doz. \$10.00 to \$15.00
Lewis Tool Co.	
Adjustable Jaw.	per doz. \$20.00
Monarch, 50%; Solid Jaw.	per doz. \$50.00
Massey Vice Co.	
Clincher.	per doz. \$40.00
Perfect, 15%; Lightning Grip.	per doz. \$15.00
Merrill's.	per doz. \$20.00
Millers Falls Oval Slide Pattern.	per doz. \$60.00
Parker's.	
Victor, 20%; Regular.	per doz. \$20.00
Vulcan's.	per doz. \$40.00
Combination Pipe.	per doz. \$50.00
Prentiss.	per doz. \$30.00
Snediker's.	per doz. \$30.00
Stephens's.	per doz. \$30.00

**Saw Filers—**

Diston's 3 Clamp and Guide.	per doz. \$34.00
doz. 30; Clamps.	per doz. \$30.00
Perfect Saw Clamps.	per doz. \$4.50
Reading.	per doz. \$6.00
Wentworth's Rubber Jaw, Nos. 1, 2 and 3.	per doz. \$50.00

**Wood Workers—**

Massey Vice Co.	
Lightning Grip.	per doz. \$15.00
Wyman & Gordon's Quick Action.	per doz. \$6.00
5 in., \$6.00; 9 in., \$7.00; 14 in., \$8.00.	

**Miscellaneous—**

Holland's Combination Pipe.	per doz. \$60.00
Massey's Quick Action Pipe.	per doz. \$40.00
Parker's Combination Pipe.	per doz. \$40.00
87 Series, 60%; 187 Series, 60.5%; No. 870, 40%.	

**Wads—Price per M.**

B. E., 11 up.	per doz. \$6.00
B. E., 9 and 10.	per doz. \$7.00
B. E., 7.	per doz. \$8.00
B. E., 7.	per doz. \$8.00
P. E., 11 up.	per doz. \$1.00
P. E., 9 and 10.	per doz. \$1.25
P. E., 8.	per doz. \$1.50
P. E., 7.	per doz. \$1.50
Ely's B. E., 11 and larger.	per doz. \$1.70
Ely's P. E., 12 to 20.	per doz. \$3.00

**Ware, Hollow—****Cast Iron, Hollow—**

Stove Hollow Ware:	
Enameled.	per doz. \$45.00 to \$50.00
Ground.	per doz. \$50.00 to \$55.00
Plain or Unground.	per doz. \$60.00 to \$65.00
Country Hollow Ware, per 100 lbs.	\$2.75

**White Enameled Ware:**

Maslin Kettles.	per doz. \$65.00 to \$70.00
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**Covered Wares:**

Tinned and Turned.	per doz. \$35.00 to \$40.00
Enameled.	per doz. \$45.00 to \$50.00

See also Pots, Glue.

**Enameled—**

Agate Nickel Steel Ware.	per doz
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